EDITORIAL

ONE YEAR OLD

This is the twelfth issue of RADIO AND HOBBIES. Just one year ago, we were planning the first issue of a magazine which would make history among publications of its kind. "We intend to lead," we wrote in the first issue. That we have carried out our intention, is evidenced by the fact that our circulation is greater than all the other technical and trade magazines in Australia put together.

Well we remember that first issue! We had no idea how many copies we would require, so we printed the best part of ten thousand. Within forty-eight hours, newsagents all over Australia were clamoring for more. The presses went to work on a second printing, covers and all. When we stopped, nearly 20,000 copies of the paper had been run off.

With each issue, our position became still more secure. We worked harder to give you the things you asked for. You will remember such receivers as the "Little Jim," the "R. & H. Portable," "The Junior Radiogram," the marvellous "4/39 Mantel Set," "Tiny Tim," the "Pentagrid Portable," the "1939 Duplex Single," and the "Advances." Add to these our latest "Simple Simon," and you have all the biggest sellers for twelve months.

Again we must thank our readers, and our friends in the radio trade, for the magnificent co-operation they have given to us. We depend on them so much for anything we might do. Again we promise to spare no effort to keep RADIO AND HOBBIES where it is to-day.

FREQUENCY MODULATION

The Big News in radio at the present time is Frequency Modulation.

In the U.S.A. we might say that the experimental part is almost over. Quite a number of stations have been licensed for this type of transmission, and receivers are being made and sold specially designed to receive such transmissions.

There are, of course, many obstacles in the way of a wholesale adoption of the idea. In the first place, it uses very short wave-lengths which are not receivable on standard receivers. Thus most of the sets now used would be useless if a complete swing-over came about.

This, however, isn't likely. An enormous amount of money is invested in our present system of radio, and no one is anxious to see it lost. We may be sure that any advances will be made very carefully.

As far as Australia is concerned, it is most unlikely that we will see anything at all of the new system, at least until after the war. It would be foolish to embark on anything so revolutionary at this time. So, although we are pleased to give you any information we can on the subject, we don't want anyone to think his radio will be out of date overnight. Every radio set now sold has a certain useful life of many years before it.

John Moyle

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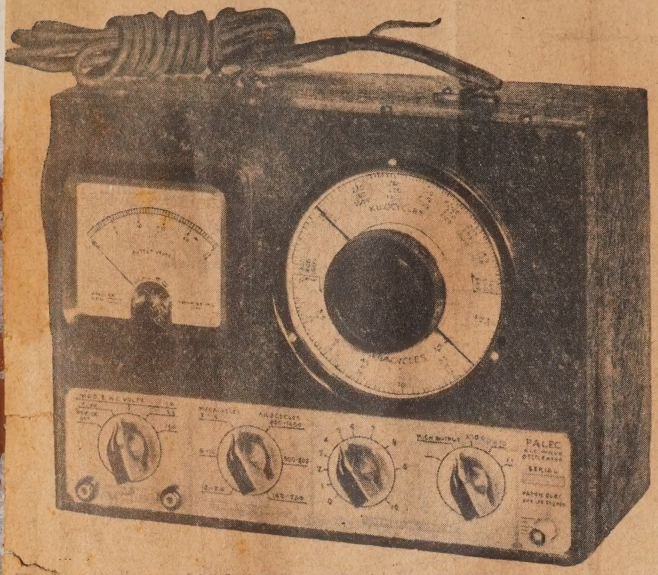
Oscillator v. Signal Generator



Fundamentally, there is little difference between an Oscillator and a Signal Generator. Both employ the same principle in generating a signal, yet an intending purchaser may be confronted with prices ranging from £10 to £150 and over—Why?

Because an instrument selling in the latter price class is invariably a PRECISION INSTRUMENT and—as precision is NECESSARY in commercial radio design and production—it is usual to PAY THE PRICE.

Precision is also very necessary for good service work.

It was with the object of giving the serviceman the maximum of efficiency and precision at a PRICE WITHIN REASON that the "PALEC" G SERIES SERVICE OSCILLATORS were progressively evolved. That a GOOD OSCILLATOR is a VITALLY IMPORTANT TOOL is now universally recognised.

NOTE OUR SPECIFICATIONS—better still, VISIT US, and see a stock model demonstrated. We claim the following "HIGH PRICED" features:—

Frequency Accuracy of HALF OF ONE PER CENT. on a direct reading dial; incorporation of a LOW IMPEDANCE 4-step PAD TYPE attenuator; reliability of REPEAT HEADINGS even over a period of years; unusually LOW LEAKAGE level; SINE WAVE Modulation at a mean value of 30 per cent.; incorporation of a compensated R.F. stage for maximum STABILITY, AMPLITUDE LEVEL and minimum FREQUENCY MODULATON; six fundamental bands from 160kc. to 24 megacycles; full range external Dummy Antenna.

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Model GA, A.C. operated	£11 15 0
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Model GAVO, A.C.-Vibrator, with built-in Output Meter	£17 15 0
Model GB, Battery operated	£11 15 0
Model GBO, Battery operated, with built-in Output meter	£15 15 0

PALEC VACUUM TUBE VOLT-METER

This new unit is an ideal instrument for either service, design or laboratory work. The circuit follows closely a design popularised by a world famous manufacturer of instruments and employs a 955 acorn tube as a diode rectifier in conjunction with a degenerative amplifier.

Features include: Ranges 0-2.5, 10-50 Volts A.C.; 3.5 uuf. total input capacitance; 5 megohm impedance at 50 cps.; scale accuracy of plus - 3 per cent. over the frequency range 50 cps. to 50 megacycles; low power factor through the use of mycalex insulation; Line regulation; A.C. operation. PRICE, £13/15/-

PALEC MODEL V.C.T.

COMPLETE VALVE AND CIRCUIT TESTER

Now in its third year and more popular than ever, the Palec Model VCT continues to supply the demand for a complete Valve and Circuit Tester in one compact unit.

Dozens of letters (on hand) from all States attest the reliability and efficiency of this versatile instrument.

The Model VCT, together with the new Palec Service Oscillator, can be aptly described as the serviceman's right and left hand, respectively. They enable every rational test and adjustment to be made on a receiver, from the aerial coil right through to the speaker voice coil—in other words, with just these two instruments, a serviceman is well, if not fully, equipped.

SPECIFICATIONS:—Tests all valves for MERIT and LEAKAGE; ELECTROLYTIC CONDENSERS; PAPER AND MICA CONDENSERS; FOUR RANGES of current, 1-10-50-250 m.a. D.C.; D.C. VOLTS, 10-50-250-1000V.; A.C. and OUTPUT VOLTS, 10-50-1000V.; a special LOW OHMS range from 0.1 of an ohm (ten ohms half scale), with three other ranges to 1 megohm.

Model "VCT" for straight A.C. operation; price, £15/10/-. Country Model "VCTC" (dual operation) works with equal efficiency on either the A.C. line or a 6-volt accumulator; price, £17/17/-.

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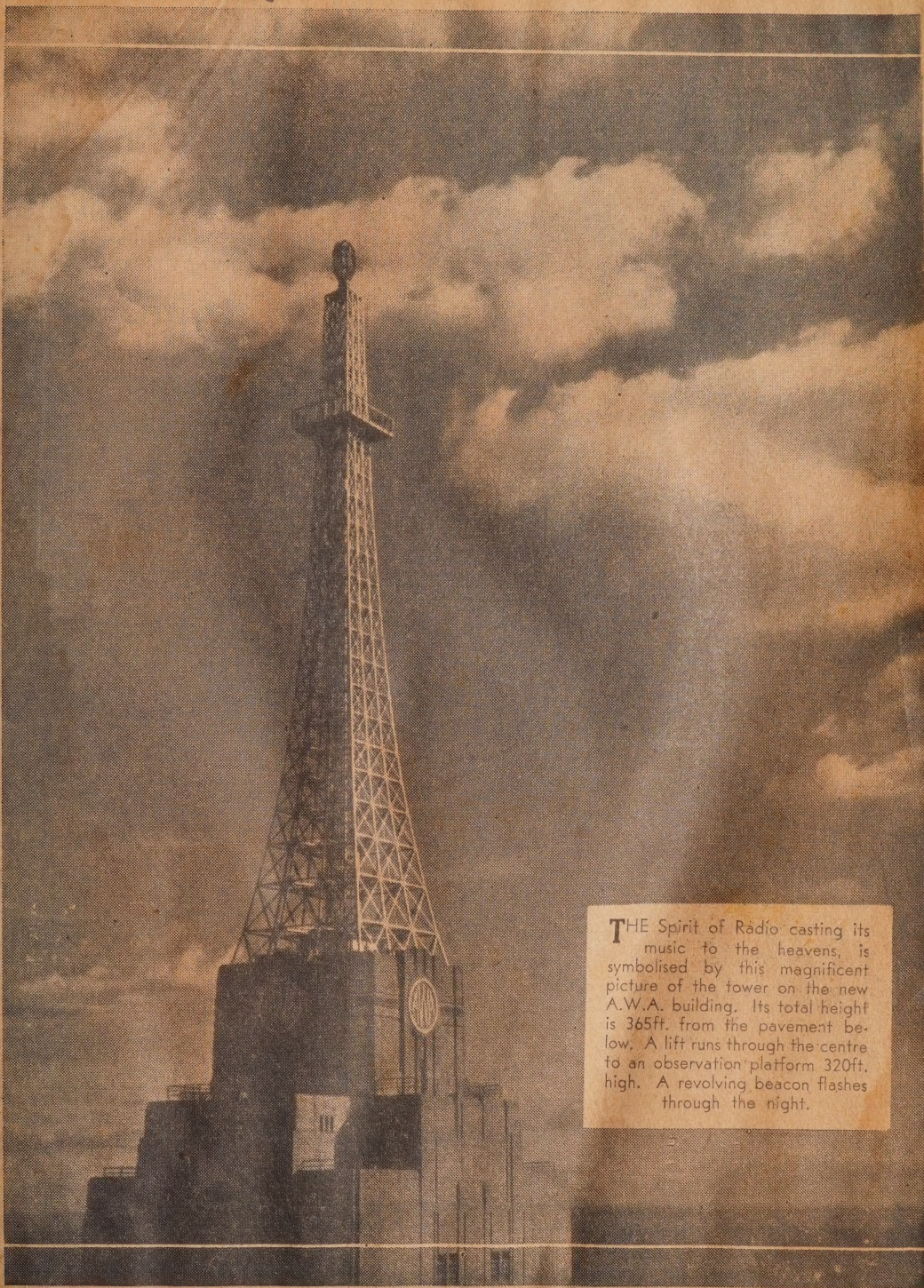


THE Spirit of Radio casting its music to the heavens, is symbolised by this magnificent picture of the tower on the new A.W.A. building. Its total height is 365ft. from the pavement below. A lift runs through the centre to an observation platform 320ft. high. A revolving beacon flashes through the night.

FEATURE STORY

WHAT FREQUENCY MODULATION MEANS TO YOU!

NEW METHOD MAY REVOLUTIONISE RADIO

AUSTRALIA MUST AWAIT RESULTS OF OVERSEAS EXPERIENCE

Major Armstrong tries out a new receiver embodying the principles he has developed.

THE biggest news of a technical nature in the radio industry is the newly developed transmission technique known as "Frequency Modulation," which has been perfected by Professor Edwin H. Armstrong, of Columbia University, U.S.A.

The name Armstrong is a byword in the field of radio receiver design. Many important patents are the result of his original research work.

When only twenty-two years of age he discovered the famous "feedback" effect, and invented the regenerative circuit which brought about a considerable change in receiver design.

THE SUPER-REGENERATOR

This most important development brought him in the vicinity of £100,000. Only a beginning, however, as he went on to develop the super-regenerative circuit, and in 1917 whilst at the Great War with the U.S. Signal Corps, he developed the super-heterodyne circuit, the basis of all modern radio receivers. For this invention it is stated the R.C.A. people paid something like £250,000!

Now, after many years of research work and expenditure, Armstrong has produced what looks to be his greatest contribution to the art of transmission and reception.

POSSIBLE REVOLUTION

Just as the talking picture revolutionised the motion picture industry, so it is claimed this new type transmission will revolutionise the radio industry.

It is not our intention here to indulge in a technical discussion. Rather, how will we benefit from this new development in the next few years?

Briefly, frequency modulation is a method of transmission in which, instead of varying the amplitude as is done at present in conventional transmitters, the frequency of the transmitter is varied under modulation.

This may not seem at first glance a very important development, but here is what is accomplished.

Firstly, since the wave-form of the transmitted signal differs from any wave-form found in nature, the transmission is not affected by statics. Secondly, since the frequency, and not the amplitude, is being varied, the power required at the transmitter is comparatively small. Thirdly, due to the fact that ultra-high frequencies are employed, there is no limit to the number of stations that can be encompassed within the band. Lastly, the fidelity of the transmission is considerably improved.

From the listeners' point of view this means static free transmission. of high fidelity, while from the transmission angle it means relatively cheap transmitters, and the opening up of an unlimited number of new channels for broadcasting purposes.

All this certainly sounds most intriguing. It will, of course, be quite some time, probably years, before we in this country will experience this new development. But it is interesting to see just what has been done to date, and to keep in mind the fact that it is a development which we can look for in the future.

FOR THE FUTURE

Since the early days of radio one of the greatest problems which has confronted engineers has been the elimination of static. Research work extending over twenty-five years has been steadily going on in connection with this problem. Armstrong himself, in collaboration with Michael Pupin, started his investigation as early as 1914, but after some years of experiment gave the subject up, convinced that there was no ready solution.

Some years later he embarked on a new line of research, and now after fifteen years it appears that the original problem of noise free reception has been solved.

And, as is often the case, the solution of the original problem has brought with it these advantages mentioned previously.

It must be pointed out that specially designed transmitters, and, of course, receivers will be necessary for this new

A few months ago we gave a rather detailed explanation of frequency modulation and its operation. This article outlines what the new method may mean to you, the listener. We would point out that much yet remains to be done before frequency modulation could even be tried in Australia. It is most unlikely that anything will be seen of it here until at least after the war.

type transmission. Already, at least, one concern in America is producing a receiver which will not only receive the new transmisison, but conventional broadcasting as well. The F.C.C. have issued sixteen experimental licences, so that a thorough test may be made of the new system.

NOISE REDUCED

From the listeners' viewpoint, the most important aspect is the elimination of noise, not only static, but man-made noises, such as electrical interference, radiation from ignition systems of cars and buses, and also valve hiss.

It has always been the aim of broadcast engineers to give the listener the "whole programme, and nothing but the programme." With this in mind, there has been an increase in the power of the broadcast stations so that a powerful signal would reach the receiver in ratio to the background noise.

You can demonstrate this very simply for yourself if you leave your receiver switched on after a powerful station closes down. As soon as the transmission ceases you will hear the noise which was drowned out by the transmission.

Although we have no "super" power stations in this country (the maximum power being in the vicinity of ten thousand watts), in many other countries there are quite a number of stations radiating five times that power.

Now, broadcast stations are expensive items, not only in their initial cost, but in the cost of power and also in respect to the replacement of valves, etc. In a country such as Australia, with a scattered population and vast areas, it is economically impossible to have a large number of super power stations. There must be some areas where indifferent reception is the rule rather than the exception.

MANY SMALL STATIONS

When frequency modulation finally reaches this country it would not be an impossibility to have quite a number of very small-powered stations to cover all parts of the country at a relatively small cost.

An unbiassed report regarding a demonstration recently given by Professor Armstrong in the U.S.A. states that the transmission was begun with a power of twenty thousand watts. This power was reduced to a mere FIVE watts (about as much power as is consumed by the tail-light of a car) with no difference in the quality of the transmission.

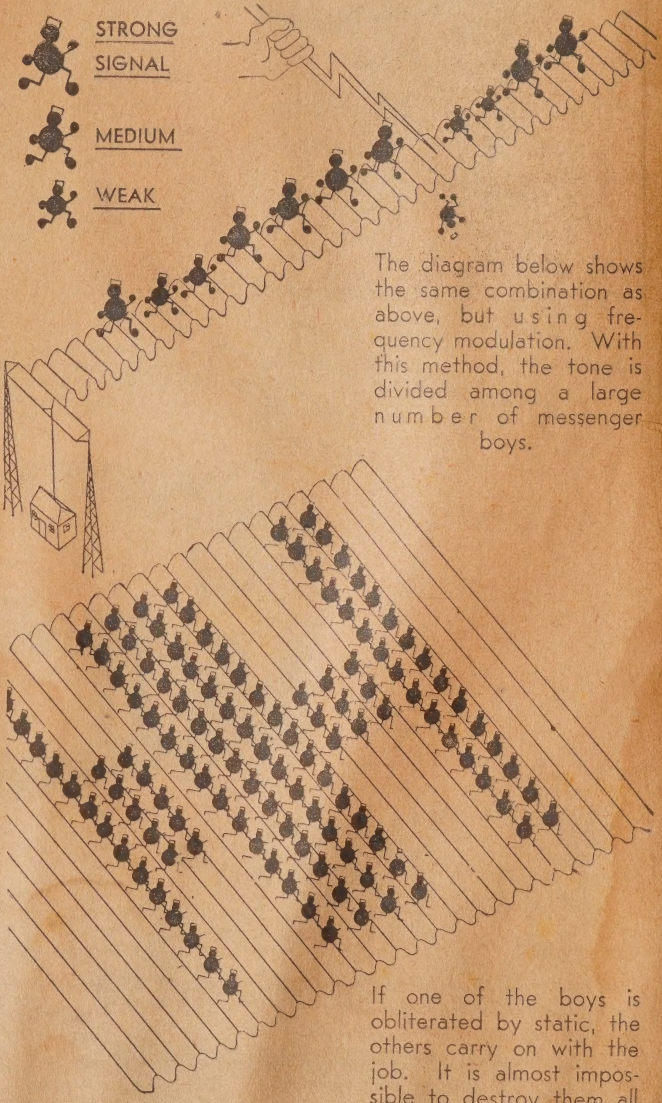
It does not require a great deal of imagination to visualise just what this means, particularly in respect to the country listener. Apart from the reduction in the cost of the transmitter, as mentioned previously, many hundreds of channels would become available, which for technical reasons have been hitherto unused.

It is not beyond the bounds of possibility for every town to have its own transmitter, and, what is more important, there would be no necessity for expensive land line connection for stations on the same network. It is technically possible

(Continued on Page 13)

FREQUENCY MODULATION IN PICTURES

These diagrams illustrate in simple form the difference between amplitude and frequency modulation. The little messenger boys each represent a musical tone, or at least, its radio-impulse equivalent. Static interference impulses are also found from time to time which, if strong enough, drown out the musical impulse in a burst of interference. All broadcasting stations at present use the method of amplitude modulation.



The diagram below shows the same combination as above, but using frequency modulation. With this method, the tone is divided among a large number of messenger boys.

If one of the boys is obliterated by static, the others carry on with the job. It is almost impossible to destroy them all at the same instant.

ELECTRICITY ENLISTS

CITY ORDINANCES may silence the auto horn, curb the dog, end even soft-pedal door-slamming, but only a better way to fasten buildings together could banish the racket of the rivets. And that is exactly what industry has found.

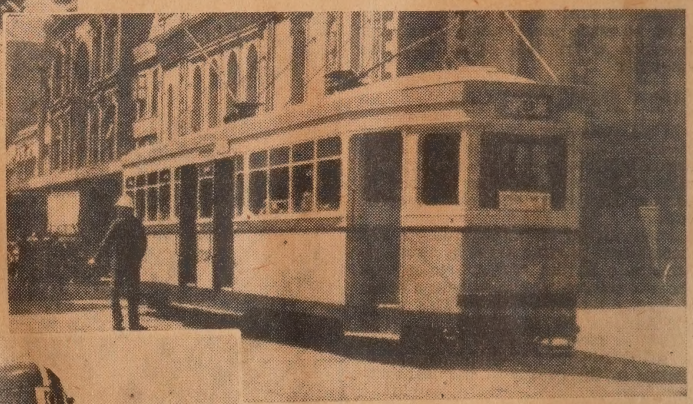
During some fifteen years engineers have perfected electric arc welding, first by direct current and later by alternating current. The brilliance of an electric arc is replacing the machine-gun rattle of the rivet hammer. Another noise on the way out of the modern world.

But even if inventions should fail to make the outside world quiet, the research engineer has provided the means for keeping the noise out of doors.

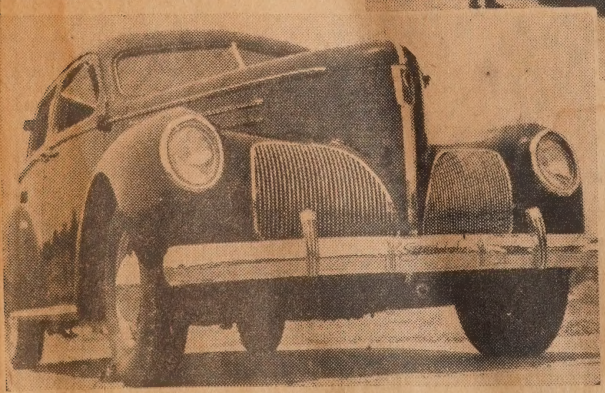
Air-conditioning not only provides continuous spring-time air for the home and office, but permits the windows and doors to be closed against noise. Sound-deadening insulations can now buttress this defence against exterior noise.

The American Medical Association has a committee studying the benefits of air-conditioning and its value in noise elimination. Dr. Carey P. McCord, of Detroit, the world-famous American physician and chairman of this committee, told the recent convention of the association in San Francisco:—

"The initial injury to the ear in deafness caused by noise probably had its beginning in fatigue. Demonstrable changes take place in the tissues of the ear, their location and extent of damage depending on the type of noise and the duration of exposure."



Three bad offenders are shown here. The pneumatic drill, the electric tram, and the motor horn, have all been the subject of special attention in Australia. Scientists are occupied in grading these noises in order of demerit.



Referring to noises "of more pardonable character" in industry, Dr. McCord said his committee is of the opinion that 90 per cent. of industrial noise could be reduced to one half of its present intensity.

Studies of noise have indicated that high-pitched tones are more dangerous to the health of employees than low-pitched tones. The din in a boiler works is more injurious than the lower-pitched roaring in a cotton spinning mill The report of small calibre artillery and machine guns is likewise more injurious than the boom of heavy guns.

These studies also indicate that workmen do more and better work when some

TO FIGHT INDUSTRIAL NOISE STRAIN

of these disturbing noises have been shut out or reduced.

But the source of industrial noise has to be discovered before it can be controlled; so out of the research laboratory has come a robot to search out the unwanted sounds. W. O. Osbon, a research engineer, developed a unique noise detective. It not only measures the intensity or loudness of a sound, but diagnoses its noise, separating it into its different parts and measuring the pitch and intensity of each element or component.

SOUND DETECTIVE

The sound-detective or sound-analyser —you can also call it "mechanical ears"— looks like and acts something like a radio receiving set of an earlier vintage. On its panels are switches, dials, and meters. Inside are four valves, condensers, and transformers. But to understand how it works it is first necessary to inquire a little more into the cause of noise.

Sound is the result of something vibrating within the audible range. "This vibrating object," explains, Mr. Osbon, inventor of the "mechanical ears," "causes alternate expansion and contraction of the medium surrounding the object, which is air in most cases. These pressure changes are transmitted in waves to all points in the vicinity of the sound source. Thus a sound wave exerts a definite pressure on any object, such as a human eardrum, within its sound field."

In order to have a common basis of discussion, technicians in the science of sound have agreed upon a barely audible sound of 1000 cycles per second as their standard of reference. Such a sound as this presses upon each square centimeter of an eardrum with the force of one five-thousandths of a dyne, or approximately three billionths of a pound per square inch.

"As the sound increases in loudness," Mr. Osbon says, "the pressure exerted on the eardrum increases tremendously. For example, if we take our first barely audible sound of 1000 vibrations and increase it in loudness to the threshold of pain it will exert a force of 3000 dynes, or about one-twentieth of a pound per square inch. Its pressure has been increased about 15 million times."

But pressure or intensity alone does not determine the loudness of a sound. It depends rather upon the combination of the sounds frequency (number of vibrations) and its intensity. Mr. Osbon pointed out that if two sounds are of equal loudness but have different frequencies, the one with fewer vibrations will in general have a greater intensity at its source and exert a greater pressure on the eardrum.

"For example," he said, "suppose a piano player hits the note 'C,' two octaves below middle 'C,' and the note 'C,' two octaves above middle 'B.' He sets up 64 and 1024 vibrations a second for the respective notes, but for a certain loudness level the lower 'C' will emit 90,000 times as much energy and exert 300 times as much pressure on the eardrum as the higher 'C.'"

EAR SENSITIVITY

The human ear is sensitive to a range of frequencies from 16 to 22,000 cycles a second, but is most sensitive between 1000 and 5000 cycles.

If the intensity of sound increases ten times, its intensity level rises one bel in acoustical terminology. The decibel is one-tenth of a bel. Some noises become so intense that they are felt as well as heard, then they are said to be on the threshold of feeling. This occurs only in the upper limit of audibility, near 120 decibels for some sound frequencies.

The purring of the family cat rates about 25 decibels. A pneumatic drill at a distance of ten feet produces a noise level of about 90 decibels.

These are the elements of sound that are tuned in by the noise analyser. The frequency of every component or contributor to noise is balanced by this hearing robot against its own mechanical filter's frequency of 7000 vibrations a second.

As the sound engineer sweeps through the analyser's frequency range, its decibel dial indicates loud noises at specific frequencies, instantaneously recording all the varying contributors to the total noise output of a machine or apparatus under examination. It singles one element out of a dozen possible elements that make up a noise. To do this it utilises a microphone and an electrical circuit closely resembling the superhetrodyne radio circuit. Where the radio has a tuned electrical filter, the analyser has a mechanical filter.

Already the supersensitive ears of the

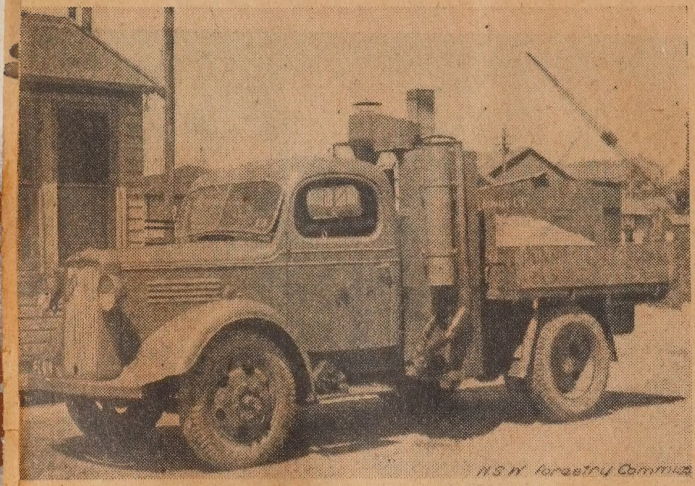
(Continued on Page 10)

MECHANICAL EARS. W. O. Osbon, Westinghouse research engineer and inventor of the portable noise analyser, right, is shown measuring and diagnosing the noise inside a motor coach.

The modern scientist is the most restless man in the world. There is always some new field for him to conquer, or some old field calling for new research. This article tells of his efforts to make our everyday life less strenuous by reducing noise, which, we are told, presents us with a major problem affecting efficiency. Electricity is enlisted on the side of the scientist.

FEATURE STORY

WILL PRODUCER GAS BECOME FUEL

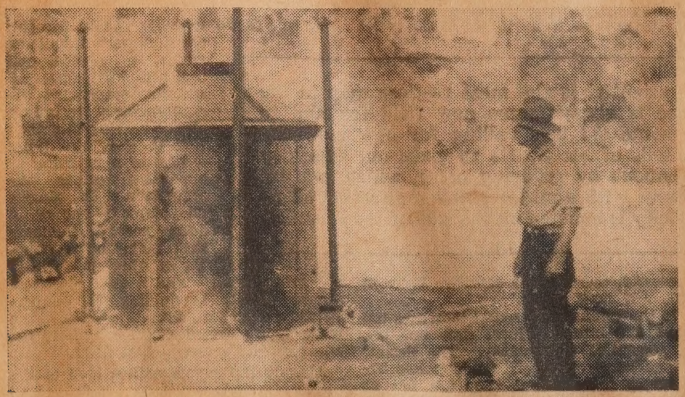


One of the Forestry Commission's heavy duty trucks in daily use, and driven entirely by Producer Gas.

Time: Some time in the future.
Scene: Country garage filling station. Motorist pulls up alongside bowser.
Attendant: Fill her up, sir?
Motorist: Yes, 30lb. please.
Attendant: Have tried our briquettes? They give more mileage.
Motorist: How much are they?
Attendant: Only 5s per ton extra.
Motorist: O.K., but make it snappy.
This may seem a bit queer at first glance, but it is not impossible if we get many more installation producer gas plants. What is a producer gas plant, you ask? Well, this is it:

THE past few weeks have seen many references to "producer gas" plants for the operation of petrol-driven vehicles in place of the conventional motor spirit. Interest in these plants has been awakened by reason of increased costs of petrol and the chance of a shortage of this important commodity, due to the possibility of dislocation of shipping services brought about by the war.

No doubt many of you have wondered



A kiln for producing charcoal, installed and used by the Forestry Commission.

THE CASE FOR AND AGAINST—

☆

just what producer gas is, what it does, and how it is generated.

WHAT IT IS

You will notice that we are only dealing with producer gas obtained from charcoal fuel, as charcoal possesses advantages over other solid fuels, the most important being that it is produced from wood, which is plentiful, and that it is a comparatively simple fuel since the tars and resins in the wood are removed in preparing the charcoal.

Fundamental Details of a Producer Plant

The producer plant consists of the following essentials:—

1. A generator, the purpose of which is to produce the gas.

2. A cooling system intended to reduce the temperature of the gas from between 700 to 900 degrees C. to at least 100 degrees C.

3. A "scrubber" provided to trap the particles of dust, soot, ashes, and fine charcoal, as it is essential that these impurities should not be allowed to reach the engine.

The above set-up is all that is required to generate the gas in a form capable of replacing petrol vapor, and suitable for driving any petrol operated engine.

The next essential is a "mixing valve," which permits the correct adjustment of the air and gas, in the correct proportions for as perfect combustion as possible.

This valve takes the place of the carburettor, and acts in a similar manner.

HOW A GAS PRODUCER WORKS

The making of producer gas consists principally of drawing a limited quantity of air through a bed of red hot carbon. In the gas producer we have a container, with an inlet for the admission of air and steam, and an outlet for the gas which eventually connects, after passing through the cleaner and cooler to the engine. The suction of the engine causes a draught of air through the inlet. The charcoal, which is on a grating in the producer, is ignited by inserting a lighted kerosene soaked wick in the inlet, and upon the air being drawn through, the charcoal will ignite, with the following result:—

On contact with the burning fuel there is firstly plenty of oxygen, and carbon-dioxide is formed (CO_2).

Now carbon has a great affinity for oxygen, and as the air supply is limited after the initial burning, more and more of the carbon combines with the oxygen available until we get the next result,

SOURCE FOR THE AUSTRALIAN MOTORIST?

—By
Wm. A. STEWART

How long will it be before Australia must rely on her own resources for power supplies? At the present time, there is no lack of petrol for industrial and private use. Sooner or later, these supplies may no longer be assured. We must therefore, exploit every avenue which may provide efficient substitutes. Radio and Hobbies has been investigating the problem from the average man's viewpoint. This article puts the case for Producer Gas—at present very much in the public mind. But there are other sources of supply which are to be considered. In our next issue, we will present the case for our Natural Gas resources, which it has been claimed, are also capable of being used in place of petrol and other imported fuels.

CO_2 plus C, giving 2CO. Now, as well as the air, steam is also allowed to enter through the same aperture. The affinity which carbon has for oxygen is also used to dissociate the elements of water to give hydrogen and oxygen, so that we also get the reaction H_2O plus C, giving H_2 plus CO (more carbon-monoxide). The first reaction mentioned above is what takes place in the open. The second reaction, together with the third, can be readily combined, but they will only take place at a high temperature in the absence of oxygen.

It will be seen that the first and second reactions can be combined, giving 2C plus O_2, giving 2CO. This reaction has the property of giving off heat, and this is used to maintain the temperature of the fuel bed and to bring about the final reaction which absorbs heat. A balance must be maintained, so that the heat of the fire does not fall appreciably, therefore the amount of steam or water admitted to a gas producer must be very carefully regulated.

USE OF STEAM

The admission of steam is very desirable as the hydrogen evolved from the water improves the quality of the gas, and the oxygen obtained from the steam is not mixed with the nitrogen from the air as is the case with atmospheric oxygen used to obtain the original reaction to obtain CO_2.

In brief, the essentials required to obtain producer gas are a hot bed of fuel protected from the atmosphere, and through which a limited supply of air may be drawn together with a controlled amount of water or steam. The result will be the generation of a mixture of gases, nitrogen, hydrogen, carbon-monoxide, and a small percentage of impurities. This mixture is known as producer gas, and when mixed with a quantity of air can be exploded in an internal combustion engine in exactly the same way as an air-petrol mixture.

When used in conjunction with a stationary gas engine, space was no object, and the producer units were on the bulky side, but when the application of these units to mobile engines was considered quite a few problems had to be overcome.

SOME PROBLEMS

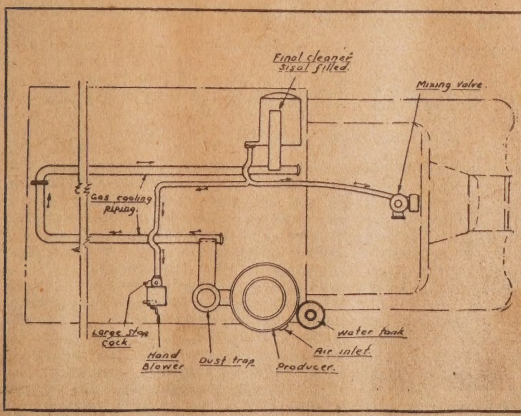
In the first place, suction gas engines run at slow speeds, usually hundreds of revs. per minute, while speeds of modern car engines are in the order of three to four thousand revs. per minute. Secondly, the load was usually constant on a stationary plant, while in respect to a car engine the load is continually varying. Thirdly, due to the fact that space and weight are considerations in respect to a mobile plant, the quantity of fuel that can be burnt is limited so that refilling is necessary at more frequent intervals than would be the case with a stationary plant.

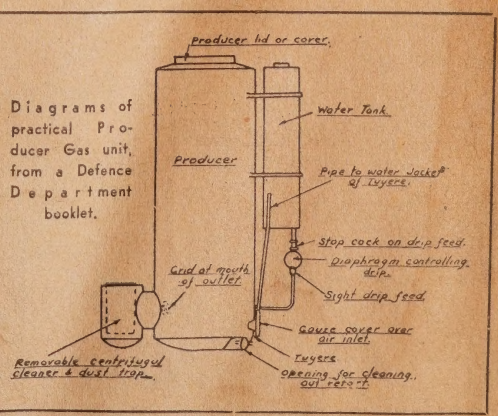
HEAT AND COMBUSTION

It is stated that an increase in temperature from 1200 to 1300 degrees Centigrade will increase the rate of combustion by ten times.

Research work and development of suitable plants for installation on motor vehicles has been going on for a number of years, and in France many thousands of these plants are in constant use, giving good service. Here in Australia at least six separate firms are making these units, but it has only been in the last few years that very much has been heard of their activities in respect to the fitting of cars.

It is interesting to note that during the depression in 1930 a few experimental plants were installed on tractors in Western Australia. These proved so successful that to-day there are more





Diagrams of practical Producer Gas unit, from a Defence Department booklet.

London's first Producer Gas bus. The unit is mounted on a trailer behind the vehicle, and burns anthracite, charcoal, peat and other substances.

han 700 tractors so equipped, giving complete satisfaction.

LOGICAL FUEL?

It is claimed that charcoal is the logical fuel for Australia, as it can be manufactured anywhere required without any duty payment, or spending money overseas. Statements have been made that there is enough timber laying on the ground to supply the total requirements for a number of years without felling any trees at all.

Charcoal can be produced quite simply by a number of methods, and in small quantities can be burnt in tanks or old oil drums. For the most efficient results sound timber is recommended, and in its final form the charcoal must be free from stones, sand and dirt. These are easily removed by shovelling the charcoal into water.

The foreign matter will sink to the bottom, after which the charcoal can be removed, allowed to drain, and bagged ready for use.

In France, the charcoal is compressed into briquettes, which give better mileage for the same volume of fuel. It is understood that briquettes will be available in this country before long, and that they will be just as easy to purchase as petrol. Although some difficulty may exist in respect to supplies at present, this matter will certainly right itself as these plants become more popular.

OPERATING COSTS

Now for some facts regarding operating costs. It is laid down that "One pound of charcoal is required for each brake horse-power hour." So that a thirty b.h.p. engine would consume 30lb. of charcoal per hour. The average producer unit is constructed to run approximately 100 miles on one charge of fuel. Charcoal costs between £3 to £6 per ton, depending upon freight charges.

Sixteen pounds of charcoal are equivalent to one gallon of petrol, which gives an operating cost compared with petrol of fourpence per gallon. To this, of course, must be added the cost of the producer itself, and these vary between £60 and £100 each, depending on the class of vehicle.

INCLUDES FITTING

This cost also includes the fitting to the car, and any alterations which may be required to the engine. The gas has an efficiency approximately two-thirds that of petrol, and it is the practice to increase the compression ratio to 8 to 1 (either by altering the pistons or by shaving the cylinder head) if the maximum efficiency is required.

The car can be started directly on the gas, but many installations include provision for starting on petrol, and after the initial suction has been created the motor will then run on the gas. It is claimed that the engine can be switched off for up to half an hour and will start up on the gas without any further trouble. On one system being marketed here in Australia, it is reported that it will start up from cold in two minutes.

It should be pointed out that, unless you are possessed of mechanical skill, you should not attempt a conversion yourself, as it is a job calling for expert knowledge.

FIRST LONG TRIP

The earliest reference we can find to any long-distance trips in Australia using a system of this type was one made by a man named Hart, who drove a car from Sydney to Darwin, and made his charcoal as he went. This took place about eight years ago. Just recently a 1934 model Pontiac 8-cylinder coupe was driven from Melbourne to Sydney in the actual running time of 13 hours 58 minutes, including refuelling time, which took place every eighty miles. The actual mileage was 571, and the total fuel cost 13s 6d. The car attained a speed of 72 m.p.h., whilst the average speed was 42 m.p.h.

FORESTRY COMMISSION TRUCKS

The N.S.W. Forestry Commission have fitted units to two of their trucks, and these are giving very satisfactory service.

Quite a good deal of interest has been created by the fact that the Department of Supply and Development have recently called for tenders for 400 of these units, and we are informed that a number of installations have been made for this department during the past few weeks.

From the foregoing it seems that there is a substitute for petrol which can be produced in unlimited quantities at very little cost, and it does seem likely that commercial users of petrol may fit units of this type in the event of any dislocation in the supplies of motor spirit.

The N.S.W. Forestry Commission have recently appointed a combustion engineer to their staff, and they are only too glad to render any assistance to persons interested in producer gas plants. The photographs and diagrams which accompany this article were supplied by them, as was much of the technical information contained herein.

They advise that they will be publishing an informative bulletin in the near future which should be of great interest. Any questions in connection with this subject will be gladly answered, providing that your query is accompanied by a stamped and addressed envelope.

Electricity Fights Industrial Noise

(Continued from Page 7)

analyser have uncovered illusive noises in street cars, aeroplanes, trains, and electric motors. It has separated the motor's noise, diagnosing it and placing the blame where it belonged. It tells how much noise is caused by unbalance in the rotor, how much by the commutator bars and the slots in the rotor, and what part is gear noise.

The principal source of the noise of a new high-speed street car in motion is caused by the roar of air rushing through the motors' ventilating fans.

Housewives usually have but scant interest in rotors, generators and the machine noises of factories, but today they have the analyser to thank for the quiet operation of their electric refrigerator, washer, ironers, vacuum cleaner, and many other small motor-driven home appliances. In all these, the analyser had done yeoman's service in uncovering noise sources.

Yet, 15 years ago, engineering science knew very little about noise. Paradoxically, it learned how to stop noise by developing means for making sounds in radio receivers, virtually building the science of sound around the radio microphone.

FINNS FIGHT WAR UNDER MIDNIGHT SUN

Left. This amazing picture shows the sun setting in the middle of the night. Taken at the Bay of Whales, it shows the weird effect of the "Midnight Sun" setting over Antarctic wastes.

With a gun mounted in skis, Finnish soldiers move into action. Much of their fighting has taken place in semi-darkness.

Most of our readers learnt all about the phenomena of the seasons while still at school. But many are still left in wonder at the idea of a sun that shines at night. This article goes over the ground once again and explains just why the Finnish soldiers fight in perpetual semi-darkness in the Arctic regions.

THE war in Finland is being fought under very peculiar conditions. Much of it is being waged in the semi-darkness of the long night of the Arctic Circle.

This peculiar phenomenon of nature is little understood by the average man or woman and is usually considered with awe when it is considered at all.

WAR TEACHES GEOGRAPHY

I think that people to-day know more about their geography than ever before, owing to the scene of international complications shifting from one place in Europe to another with such rapidity, that if one wishes to keep abreast of affairs a constant study of the old school atlas becomes necessary.

Nevertheless, there is still a prevalent idea that the Arctic Circle is inhabited only by such people as Eskimos, and, therefore, is of no importance in everyday affairs.

If one were to consider only that part of the earth between the Arctic Circle proper and the North Pole, then the above idea would be somewhat correct. But if a glance is taken at a map of Europe, or, better still, the world, it will be readily seen that there is quite a considerable portion of the civilised world living either on the boundaries of the Arctic Circle or just north and south of it.

IN THE ARCTIC CIRCLE

There is the north of Canada, Alaska, Siberia, Russia, Finland, Norway, and Sweden. These countries are of considerable importance in world affairs in the way of commerce and music and art, &c., and, of course, the Russo-Finnish war has heightened interest in the north of Europe.

The Arctic Circle is that portion of the earth's surface extending from the Pole and bounded by the 66th parallel of latitude, approx. How the position of the Arctic Circle was arrived at I will show later. In order to understand the reason underlying the effects of the sun's rays on the earth it will be necessary to refer to diagram (A). We will also assume that the axis of the earth is perpendicular to a line C-E drawn through the centres of the sun and the earth.

It will readily be seen that as the earth revolves on its axis once in 24 hours the sun will enlighten one half the earth, and as it is day at any given place so long as that place continues in the enlightened hemisphere, every part except the two Poles must be one half of its time in the light and one half in darkness.

In other words, the days and nights would be equal to every inhabitant of the earth except to those at the Poles. The reason that the Poles are excepted is because the view of the spectator at the Poles must be bounded by the line C-E, which to them is the horizon, and, consequently, the sun would never appear to rise or set, but would always be in the horizon.

If the axis of the earth was thus perpendicular the rays of the sun would fall perpendicularly on the Equator, and, as the heat of the sun is greater as they fall more perpendicularly on any object,

By Calvin Walters

teady nerves and sharp eyes are required by rifle-men who never see the full light of day for months at a time.

e Equator would be scorched up, while at part of the earth between 40 and 50 grees on each side of the Equator would desolated by an unceasing winter. In order to avoid this an all-seeing eator simply tilted the axis of the rth about 23½ degrees out of the perndicular.

HE INCLINED AXIS

In order to understand the effect of is, please glance at diagram (B). It ll be seen that all the parallel circles e now divided into two unequal parts, ving a greater or less part of their reumferences in the enlightened than the dark hemisphere, according to eir situation with respect to the North nd South Pole.

The season of the year represented this diagram is our southern winter, r if the latitude B-L represents the rcle of the globe on which Australia situated, it will be seen that about vo-thirds of it is in the darkness, hile about one-third is in the light.

ENGTH OF DAYS

That is the reason why our days are horter in the winter than in the summer and the nights are longer; and if you look at the latitude further south you will notice a still greater disproportion between the day and night and the parallel more south than this is entirely in darkness and it is all night there.

To the whole space between this point and the Pole it is continual night for some time, the duration of which is in proportion to its vicinity to the Pole, and at the Pole there is a permanent night for six months on end.

Going north from the line B-L it will be seen that the amount of daylight becomes greater in proportion to darkness until we reach the North Pole, where it is continual light for six months on end, or, in other words, to the inhabitants living in equal parallels of latitude, the one north and the other south, the length of the days to the one will be equal to the length of nights to the other; and while it will be winter to the one, it will be summer to the other.

To those people living on the Equator the days and nights will be always equal. This is evident from the diagram, for in every position of the globe one half of the Equator is in the light, while the other half is in the darkness.

Reverting to our Arctic Circle, I mentioned above that at a point south of the line B-L it becomes all night. This is the point called the Antarctic Circle in the south and the corresponding point in the north is the Arctic Circle. These Circles are really the horizon to those people living at either Pole.

THE EARTH'S ORBIT

Diagram B, as mentioned above, represents the position of the earth with respect to the sun in our southern winter or northern summer.

In order to get an idea of the conditions necessary for the reverse, namely, a southern summer and northern winter, it will be necessary to study one more diagram. Look now at diagram C.

This represents the orbit of the earth round the sun. If you have forgotten your elementary astronomy you will forgive me if I mention that the earth, as well as revolving on its axis once in approximately 24 hours, also moves round the sun and completely encircles it in approximately 12 months. This is called the orbit of the earth, which our last diagram represents.

Now you will notice that our diagram B is simply the right-hand side of diagram C, and it is a simple matter to see what happens when the earth reaches the other positions shown.

It must be clearly understood that the axis of the earth remains in the same position throughout the earth's journey round the sun. In other words it keeps on its travels a direction parallel to itself.

FOLLOWING THE EARTH

As the earth moves from its left-hand position in an anti-clockwise direction (the direction of the arrows) round the sun, the parallels of latitude are getting more and more light for a longer period. Let us follow the earth on its journey.

Beginning at the right side of the diagram, where you see marked June 21, it will be seen that the North Pole inclines towards the sun, and, consequently, brings all the northern parts of the globe more into light. Then to the northern people it is midsummer and to the southern people midwinter (including Australia). In the month of September the axis of the earth does not incline to or decline from the sun.

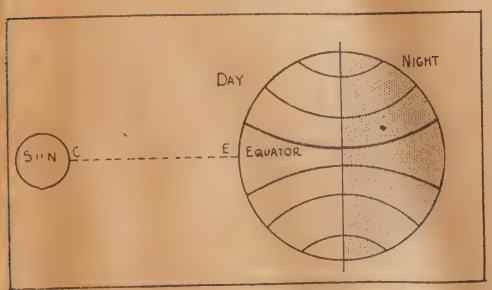


Diagram A. What would happen if the earth's axis were at right angles to the sun's rays.

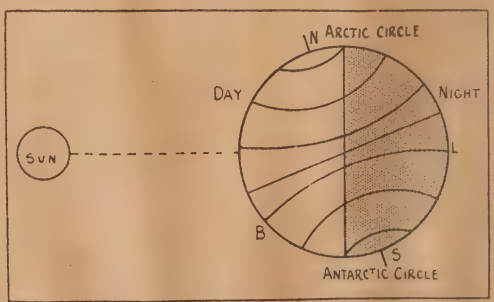


Diagram B: Actually the axis is inclined to the perpendicular at an angle of about 23½ degrees.

The poles are now in the boundary of light and darkness, and the sun is perpendicular to the equator, making equal day and night in all places.

AUSTRALIA'S SUMMER

Moving round now, we find that the North Pole gradually declines away from the sun and the northern days are becoming shorter, while the southern days are getting longer until we reach December, when we are in midsummer in Australia and the southern hemisphere, and midwinter in the northern hemisphere.

Continuing our journey we find that the earth's axis again becomes in a position similar to that of September and we have equal day and night in all places until March 21, when it is autumn in the south and spring in the north.

Finally, we reach June 21 again at midwinter, and we have completed our journey through the seasons. It is interesting to note that since it is summer to all those parts of the earth to which the sun is vertical, and as the sun is vertical to the equator twice in a year, the equator will, therefore, have two summers in one year.

Should the diagram C seem difficult to understand, a glance at D will clear the matter up.

Imagine the earth to be standing in the one place in space, but, of course, revolving on its axis and the sun moving up and down, say, from bottom to top and down again once in twelve months.

DAYLIGHT AT THE POLES

Beginning from December 21 you will see that the sun is above the Tropic of Capricorn, and the light will illuminate the southern hemisphere more than the northern, and it will be summer in the south and the pole will have daylight all the day through.

As the sun moves north it will illuminate less and less of the south, and the days there will get shorter while the north will get more light and the days will get longer. The sun eventually becomes vertical to the tropic of Cancer and the north and the North Pole will have daylight all day through and the South Pole will have darkness all the day through. It is now summer in the north and winter in the south.

At September 21 and March 21 the sun will be vertical to the equator. It will, therefore, be summer at both times at the equator, but at March 21, that is on the sun's up journey, it will be autumn in the south and spring in the north. But at September, that is on the sun's down journey, it will be spring in the south and autumn in the north.

This diagram is not really accurate, but for our purposes serves to explain the seasons in as simple a manner as possible. I have not seen this diagram elsewhere, so I trust that all you budding astronomers will have mercy and remember that it is used here for the benefit of those not so well informed in matters of astronomy. When those have become masters at the science, then they will see for themselves how useful the idea was to explain a difficult subject.

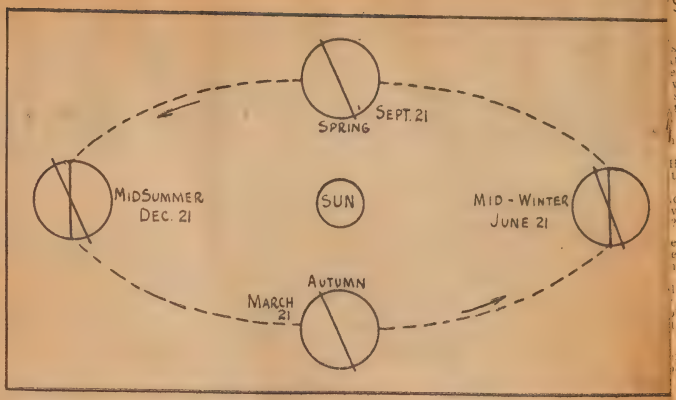


Diagram C: Showing the path of the earth in its yearly journey round the sun.

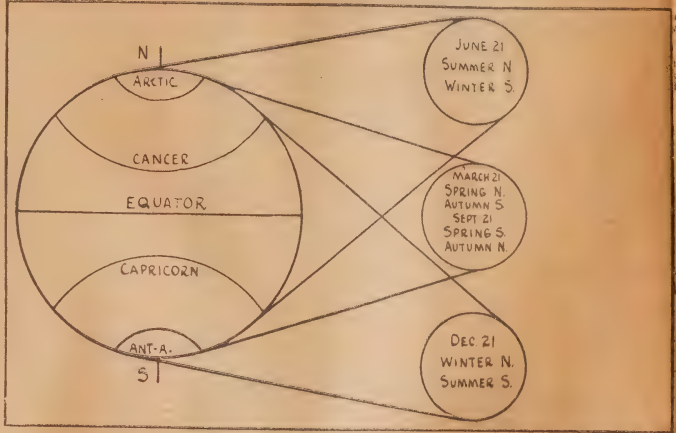


Diagram D: A simple diagram assuming that the earth is stationary and the sun in motion.

WHAT FREQUENCY MODULATION MEANS TO YOU

(Continued from Page 5)

to operate a number of stations on the one frequency, which could all receive and transmit the same programme at a fraction of the present cost.

After reading the foregoing remarks, remember that whilst this new transmission is no longer "just around the corner," it is certainly over the hill. As far as we are concerned here in Australia, it is quite a steep and rock-strewn hill, and it is very unlikely that we will hear this new type transmission until the present European conflict is ended.

You may ask, "What will happen, then, to all the old receivers?"

The change, of course, will be a gradual one, should it eventuate, and more than likely this new transmission, when it does come, will work side by side with our present broadcasting system.

Receivers will be produced to receive both types of transmission, just as the majority of our present receivers will bring in not only the regular broadcast programmes, but short-wave transmissions as well. One might ask, "What happens to all the old cars, and, for that matter, out-of-date furniture?"

In conclusion, it is pretty safe to predict that, just as the last war brought to light many new developments in connection with radio, so will the present war. Who knows that, by the time it is ended, more startling developments than frequency modulation will be available to further improve radio technique as we know it to-day!

The Magazine for People with a Hobby

Model 'Plane Builders

AMATEUR PHOTOGRAPHERS

STAMP COLLECTORS

SCIENCE & INVENTION

CHESS, GAMES, ETC.

WHATEVER your hobby there's a "World's News" feature to interest you. The "World's News" is the only New South Wales publication that informs you of the doings of model aeroplane organisations. It gives as well, particulars and plans of new models, hints on construction and is conducted by a well-known enthusiast in the sport. Amateur photographers and stamp collectors will find the sections conducted for them packed with interest, and the science and invention feature is a mine of information and handy hints for mechanics, motorists, engineers, gardeners and homemakers. Gregory Koshnitsky, chess champion of Australia, regularly provides a fascinating page for players, and there are features devoted to draughts, crossword puzzles, &c. The seeker for information in medicine, foreign affairs, travel, science, detection, will find pages of fascinating reading, because the "World's News" specialises in unusual articles about these subjects.

FICTION TOO

Every short story and serial published in the "World's News" has been chosen from scores submitted. You will find every week tales with a spice of adventure and more than a dash of action. That's how it earned its reputation as "Australia's best mgazine of fact and fiction."

EVERY WEDNESDAY

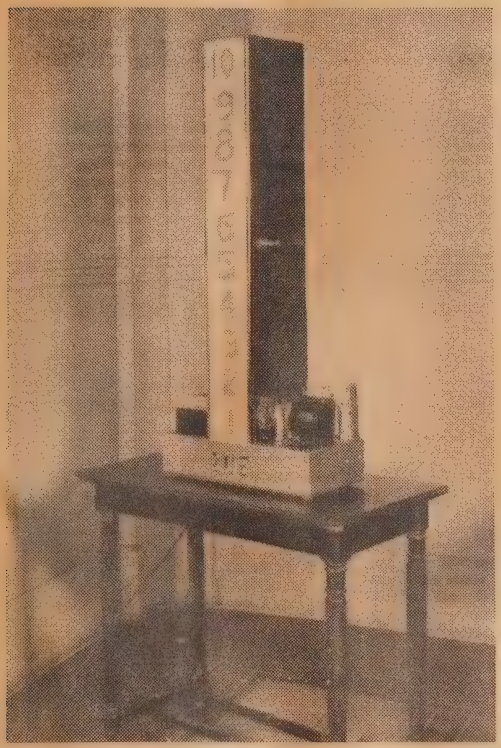
World's News

2D.

NEW DEVICE MEASURES YOUR APPLAUSE

AT 2UE BROADCASTS

The popularity of the amateur performances sponsored by Station 2UE has led to the development of a novel apparatus for registering the loudness of applause. Thus the vote of the audience is no longer judged by air—it is accurately registered on a new instrument—the Acclaimometer.



Here is the first published picture of the acclaimometer. The graduated scale is seen, by which the audience may read off the result. Tests so far show that an aural estimate is generally very close to the machine's measurements.

By MURRAY STEVENSON
Chief Engineer—2UE

Several possibilities were considered when the engineers set themselves to design the apparatus. After much experiment, it was decided to scrap all old ideas for such things and use only the latest ideas and devices.

The next step was to decide on the form which the apparatus would take, realising that it must be such that it could be easily seen by quite a large audience, and also easily interpreted by them. The simplest solution of this seemed to point to the type of equipment finally built, which consisted of a series of ten numbers painted on opalescent glass, each in front of an individual compartment containing a small electric bulb to provide illumination for its own particular numeral.

HOW IT WORKS

Associated with each bulb was a type 885 gas-triode valve and a telephone type relay. It is well-known that the gas-triode type of valve will not pass current between plate and cathode if the negative bias on the grid exceeds a certain critical value, but if for an instant the negative bias on the grid is reduced below this critical value, the gas with which the valve's envelope is filled becomes ionised, allowing plate current to flow.

The electric lamp is placed in series with the plate of this valve, and then when the valve is ignited, by having its grid voltage reduced below a critical value, current flows and the lamp lights.

By arranging 10 complete sets of lamps and valves and making No. 2 valve a little harder to strike than No. 1, and then No. 3 a little harder still than No. 2, and so on up to No. 10, the lamps can be illuminated in turn, beginning with No. 1, by the application of a gradually increasing positive voltage to each grid in turn—this positive voltage actually counteracting the effect of the negative bias applied to the grids to prevent them from striking.

CRYSTAL MIKE USED

If this positive voltage which is applied to the grids to strike the tubes is made to vary according to the intensity of the sound picked up by a microphone, we have a means of lighting up the bulbs behind the numbers in an order which corresponds to the loudness of the sound produced. If the sound reaches a certain level sufficient positive voltage may be developed to illuminate lamps up to No. 5, and if a slightly higher positive voltage is developed by a slightly louder sound No. lamp will light, and so on.

It remained to design the circuit details. First of all, a small sound c type of crystal microphone was chos as the pick-up unit, being very sm in physical dimensions and therefc easily suspended on a long rod in place where it picked up sound witho favoritism to any section, from t whole of the audience.

The three stage amplifier employ two 6C6 pentodes, followed by a 6 triode, which gave sufficient gain raise the voltage developed by t microphone to a value sufficient to pr vide positive potential to strike 885 co trol tubes.

As a positive voltage was necessa to counter the negative fixed bias c the grids of the control tubes, the ou put of the amplifier was applied to 6C5 valve operating as a detector ar the uni-directional positive output vol age of this valve was applied to t grids of the first control tube.

THE 885 IN ACTION

When this positive voltage reaches certain value sufficient to reduce th fixed bias on the first 885 below strik ing potential the tube strikes, illumina ing the lamp connected in series wit it, and thus illuminating the figure in front of this lamp.

At the same time a telephone typ relay, whose coil is connected in serie with the cathode of the control tube, i energised. A set of contacts on thi relay disconnects the positive operatin voltage produced by the detector fron the grid of control tube No. 1, and con nects it to the grid of control tube No. 2

If the positive voltage is now suffi ciently great to strike tube No. 2, No. lamp is also illuminated, and anothe relay connected with No. 2 control tub is energised, and this in turn hands or the operating potential to No. 3 contro tube.

As each tube strikes it remains in this condition even i the operating potential supplied by the detecto falls off due to the applause sub siding. I nthis way the highest point to which the applause climbs is indicated by the illuminated numeral correspond ing to that volume of sound, and the numeral remains illuminated.

T HAPPENED THIS MONTH

Radio and Science in the News

Spies Over A.B.C.

E general manager of the A.B.C. has scouted any suggestions that spy sages could be broadcast from our rt-wave stations during regular pro- mmes. He was replying to a sugges- of the danger, made by the South tralian Natives' Association. No ign artists were employed in the rt-wave broadcasts, he said, and the e taken in translating broadcast mat- by the Ministry for Information was ficient to prevent such a possibility.

* * *

visible Searchlight

Y means of an ultra-violet ray, which is reflected from the fuselages of hting planes, the Germans are ex- rimenting with a searchlight which nnot be seen with the naked eye, says London newspaper. The machines are st detected by sound-locators, and en picked up by means of the ray, hich translates their position to a ss plate, over which moves a spot of ht indicating the plane. The rays n penetrate clouds and mist which uld block ordinary light rays.

Radio On Italian Trains

IN Italy, engineers are equipping their railway stations with radio transmitters. The idea is that passengers shall be able to talk from trains while these are in motion. Italy has always been progressive in the use of radio, and has done much with ultra-short-wave transmitters in civil and military activities.

* * *

Dust Makes Power Poles Burn

A LAYER of dust over the insulators of electric light poles in Sydney caused short-circuits which set the poles alight. The layer of dust, when dampened by light rain, formed a comparatively low-resistance path across the insulators, through which a comparatively high current could pass. At one street in Leichhardt four poles were burning within 200 yards of each other. Others provided spectacular displays, as the current leakages lit up the street with a weird blue light.

Mr. Rex Shaw, of Sydney, has invented an electric organ which uses a series of recorded discs from which he can select almost any sound at will. Every type of musical instrument and human voice can be duplicated at will. He has been working 12 years on the design. His instrument, shown here, is the only one of its kind in the world.

South Pole Goes West

ACCORDING to Rear-Admiral Byrd, who is at present on a scientific expedition in the Antarctic, the South Pole has moved westward since it was first calculated in 1909. He bases his opinion on observations made by his expedition in the vicinity of Victoria Land.

* * *

Guns To Fire 155 Miles

THE reports of a German long range gun, capable of firing a 660lb. shell 155 miles, are not dismissed as being impossible. During the last war, a gun bombarded Paris over 80 miles with shells weighing over 200lb. The new gun, it is claimed, can fire at an angle of 70 degrees, during which the projectile travels through the stratosphere at a height of 50,000 feet.

* * *

Australian Research And War

THE Council for Scientific and Industrial Research (Sydney) has recently extended its laboratories to facilitate work directly concerned with Australia's war effort. At the moment, special research is being conducted into the use and preservation of fruit and fruit juices, and on the shrinkage properties of wool. The council has done some quite remarkable work in the past, some of which has been made use of overseas.

* * *

Hardwoods Defy Incendiary Bombs

AN amazing demonstration was recently carried out by the National Emergency Service, showing that Australian hardwoods can resist the effect of incendiary bombs better than can metal. Mixtures which will easily burn through metal sheets have had practically no effect on Australian blue gum turpentine wood. Mixtures which will melt through a steel shovel in six seconds were burned on the wood for two minutes and ten seconds. The flame penetrated the wood to a depth of only .35 of an inch. As a result, shovels are now being made of flame-resisting woods for use in possible emergencies.

* * *

Anti-French Transmitters

TWO secret radio stations broadcasting anti-French propaganda have been located by means of direction-finders. Although the transmitters were ostensibly broadcasting from France, one was located on the German side of the Rhine, and the other somewhere in Poland. Other reports indicate that Europe is well supplied with secret radio stations, broadcasting propaganda against Germany.

HUMPERDINK'S CAMPING HOLIDAY — PART 2.

After gorgeous swimming, tunes in community singing—family joins in.
Holiday spirit gets to work—invites next-door campers to participate.
While Mrs. H. flits the flies in time with the music.
Sudden storm puts damper on aforesaid holiday spirit—
But H. continues in spite of difficulties inside the tent.
Unfortunate effects of storm bent on upsetting carefree life under canvas—
And guests, rather worse for wear, depart leaving chaos and a fist print in Humperdinkian eye.
Humperdink returns portable set to its rightful owner.

Spies Use Chimney Radio

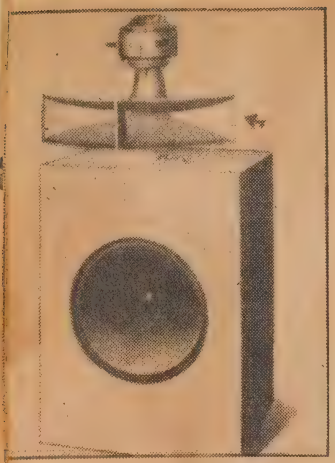
A GERMAN spy plot, extending to many parts of Norway and Sweden, was recently unearthed by the discovery of a radio station hidden in a chimney. It was tracked down to a house in Narvik, Norway. The owner was a German named Mueller, controlling a German smelting works exporting Swedish ore. Authorities believe this station has broadcast information leading to the sinking of many foreign ships carrying ore for the Allies. Papers seized during the raid make it certain that Mueller had been in constant touch with U-boats.

Bed-time Stories For Hitler

A FRENCH radio station broadcasts a special bed-time story for Hitler, who, it is reported, is often unable to sleep. The broadcast includes soft music and the steady ticking of a clock. An announcer recites, in a soft voice, a jingle, recalling the dead citizens and soldiers of Germany's conquered countries, as one would count sheep jumping over a stile. It is not known whether Hitler listens or not.

Broadcasting Battle

GERMANY is using young radio announcers to relay shot-to-shot descriptions from fighting planes, speedboats, and anti-aircraft emplacements says the Berlin radio. They operate under military orders, and wear military uniforms. Several broadcasts have already been made from the Western Front.



NEW W. E. TWEETER

A single horn which does the work of 4 trumpet-type loudspeakers in distributing upper-register sound was announced last month by the Western Electric Co. This new 31A horn is here shown (arrow) mounted atop a conventional bass unit to form a 2-way hi-fi loudspeaker system. Response of this "tweeter" is 400 to 10,000 cy. Novel shape affects wide sound-distribution horizontally.

PROJECTILES STEERED BY RADIO

PROJECTILES steered by radio to crash into enemy aeroplanes, submarines or battleships are envisioned in a patent (No. 2,176,469) warded to Henri Moueix, of Paris. Even when enemy raiders are hidden behind clouds, mist or smoke, the radio-controlled projectile would reach the target, it is claimed.

The projectile carries two short-wave radio transmitters and a receiver. One of the transmitters broadcasts a beam of dashes, while the other broadcasts a beam of dots. The two bands overlap to form a beam giving a continuous note which is right on a "bead" with the enemy craft.

In operation, the bearing of the enemy plane or vessel is located by listening devices. The radio-controlled projectile is then fired at the target. The projectile in flight sends out short-wave signals. The beam of radio signals sprays the enemy craft. Those radio waves striking the enemy craft are reflected and picked up by the receiver on the projectile.

The receiver in turn controls the movement of rudders or vanes on the projectile, depending on whether dots or dashes are received. In this way the projectile is steered while in flight to take a direct "bead" on the craft.

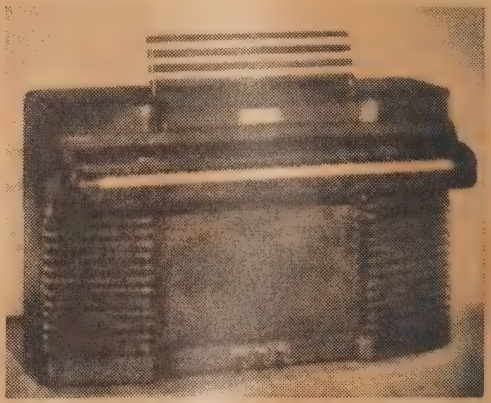
The patent is assigned to Compagnie Generale de Telegraphie sans Fil, a corporation of France.

—"Science Digest."

The TECHNICAL

LATEST ELECTRIC PIANO

Electronic instruments are always interesting. Every few months, something new seems to come along in this sphere. Here is a most interesting article from "Radio-Craft" with some unusual features.



Here is the console of the piano. The action is said to be identical with that of the standard instrument, so that the touch to the pianist remains the same. Sound amplification by electrical means gives it an almost unlimited output.

IN addition to operating as an electronic piano, the new "Storytone" instrument here illustrated and described operates as a radio set, or as a phonograph, if the available special piano-bench (illustrated) is used. This bench contains an RCA Victor radio set and phonograph, in separate sliding drawers, which makes it convenient for the pianist to accompany on the piano any record he may wish to play on the electric phonograph.

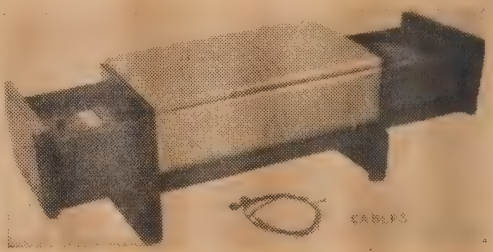
TECHNICAL FEATURES

The Storytone piano incorporates a 7-tube amplifier with an output of 15.8 watts. The loud-speaker is mounted in an acoustical labyrinth which covers the entire back of the piano. High frequencies are radiated directly from the speaker baffle; low frequencies, from the labyrinth.

As with most electronic pianos, a swell-pedal makes an organ characteristic possible. The piano may be played, even by a child, at auditorium volume; or at barely audible volume as a practice piano! This dynamic range is quite impossible to obtain in non-electric or mechanical pianos. A special control permits adjusting the instrument to suit individual room acoustics!

The action of the piano is said to be identical with a standard instrument so that the touch to the pianist remains the same.

Since the instrument is susceptible to stray magnetic fields, it should not be placed near other electrical equipment containing power transformers or rotating equipment such as motors or generators. This is particularly true in theatre installations.



The piano stool has drawers at each end. One of these houses a complete radio set, and the other a gramophone turntable. The pianist can accompany himself by records if he desires.

EDITOR'S WORLD REVIEW

Developments in other lands

The electro-acoustic system consists of three major items. First, a magnetic pick-up which translates the mechanical vibrations of each string into electrical impulses. Second, a high-fidelity electrical amplifier capable of reproducing the full audio range and having an output of 15.8 watts (2 per cent. R.M.A. harmonic distortion).

Thirdly, an acoustic transducer system consisting of a ruggedly constructed permanent-magnet dynamic loudspeaker and a folded exponential baffle or horn capable of reproducing with remarkable fidelity and power the tonal qualities required of the fine instrument of which it is a part.

MAGNETIC PICK-UPS

In order to translate the mechanical vibrations of the strings into electrical vibrations or impulses so that they may be amplified, individual magnetic pick-ups are used for each note.

These individual units are assembled on eight separate mounting plates, accommodating either 8, 10 or 16 units depending upon their particular location in the instrument.

Each pick-up plate assembly consists of a soft steel mounting plate and 8, 10 or 16 magnets with a duplicate number of soft pole pieces. A coil assembly is located over each individual pole piece, and they are all connected in series and wired to a terminal board. These eight pick-up plate assemblies are rigidly mounted at a fixed distance, adjacent to their respective strings.

VOICING

For simplicity of construction and ease of assembly and service, the pick-up

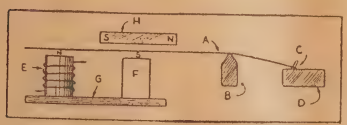


Fig. 2. "Voicing" is a new job for Servicemen. units are rigidly mounted in sections, as previously discussed, at definite spacing from their individual strings.

Therefore, it is necessary to "voice" or equalise the output of the individual strings. This is done before the piano leaves the factory. But should it become necessary to replace a pick-up unit in service, the following procedure is given.

Voicing is accomplished by the following method, which consists of **individually magnetising the strings corresponding to each note** to an appropriate degree and polarity adjacent to the pick-up, thereby either increasing or decreasing the pick-up volume.

Referring to Fig. 2, a single steel piano string is represented. The steel used for such strings is very readily magnetisable. This string shown at A passes over the usual bridge B, and has one end attached to the hitch pin C, in the pin rail D, the other end being provided with appropriate tensioning means.

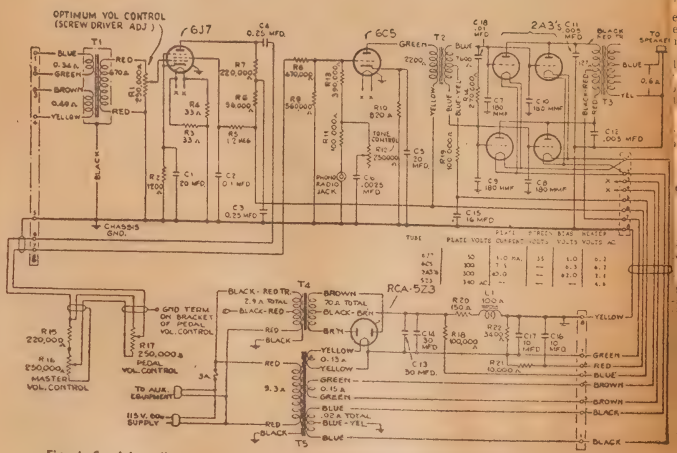


Fig. 1. Servicing diagram of the special RCA high-fidelity amplifier which outputs 20 watts.

Underneath the string is shown a magnetic pick-up consisting of a coil E wound on the soft iron core and the permanent magnet F located on mounting plate G. The permanent magnet F induces magnetism in the core of coil E forming poles as indicated. When string A is sounded, a voltage is generated in pick-up coil E.

The string A can be magnetised longitudinally by placing a bar magnet H having poles, S and N as indicated, spaced approximately the same distance as the spacing of the pick-up coil E and the permanent magnet F, and moved along and substantially in contact with the string.

The effectiveness of this magnetisation on the pick-up volume depends on how closely the poles of the magnet H approach those of the pick-up unit.

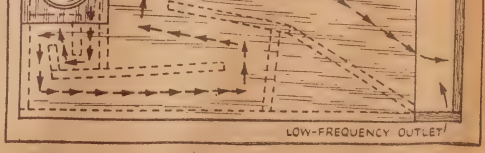
In other words, when the degree of magnetisation in the string adjacent to the poles of the pick-up is increased as would be the case with the poles of the bar magnet H as shown, the current through the pick-up coil will be materially increased for a given amplitude of vibration of the string.

If the poles of the magnet H are reversed in position relative to the pole on the pick-up unit and the string is thus magnetised, then the amplitude of the current in the pick-up coil will be decreased.

By following the above procedure the output from the weak notes may be increased and the output from the strong notes may be decreased, producing the desired output over the entire scale for uniform force applied to each key.

In order to equalise the output of the various notes, it is not necessary to use an output meter across a resistance load in place of the voice coil, for the use of the human ear is entirely satisfactory, since it is, in the end, the final criterion.

In order to check for grounds or opens in the pick-up units, should a lack of volume be apparent while voicing, open pick-up leads to amplifier, and between various pick-up sections in turn to localise the trouble.



The loud speaker chamber is shown here. The bass notes are developed in the sound chamber with an outlet at the side. The middle and high frequencies are radiated direct from the cone.

Left—

The altimeter depends on a wave reflected from the ground. The plane contains a transmitter which sends out the signal, and a receiver which picks it up on its rebound from the earth.

RADIO ALTIMETER USES MICRO-WAVES

It Tells Exact Height Above Ground

RADIO, in its quest for new frontiers to conquer, was recently called upon to solve the most baffling problem in "blind" flying: "How high is up?"

Scientists the world over have sought for years to invent a device which would tell the aeroplane pilot, flying on instruments," how high he is above the invisible ground; not above the theoretical sea level many miles away, but above the actual terrain over which he is flying.

Moreover, this information had to be made available to the pilot accurately, instantaneously and continuously. It had to be independent of the dozens of variable factors which affect the usual run of navigational instruments.

Day or night, rain or shine, in storm, sleet or snow, over mountain or prairie, over jagged skyscrapers or smooth lakes, anywhere and at any time, it had to work faithfully and accurately, telling the pilot every instant how high he is over the highest point of the terrain directly below him.

It was a tough problem, but radio solved it.

RADIO ALTIMETER SIMPLE

In its essence, the radio altimeter is a simple device. It measures the time interval between a radio signal and its "echo" reflected from the ground.

Its working principle is no different from that of the familiar sonic depth meter widely used in hydrographic surveys—except that sound waves travel at the rate of 4938 feet per second, and that only in "standard" water, while radio waves move at the rate of 186,300 miles per second, anywhere and at any time.

That is more than a billion feet per second, and the radio altimeter must consequently measure accurately time intervals of inconceivably small duration.

The present radio altimeter can accurately measure time intervals of 1-20,000,000th part of a second, corresponding to a height of 20 feet, and will soon be able to measure, just as accurately, time intervals of 1-50,000,000th part of a second, corresponding to a height of about 8 feet!

Strangely enough, while scientists the world over were looking for a solution to the problem, they had, all unaware, known it for years. As far back as 1915, reflected electrical waves were used for locating breaks in long-distance telephone cables.

Later, similar methods were used for measuring lengths of water pipes when only one end was accessible. Railroad collision prevention devices, similarly operated, have been known for years.

These methods of using reflected electrical waves was finally perfected as a radio means for measuring the height of an aeroplane above the ground. Their basic mathematics are the same!

OVER LARAMIE RANGE

Last summer, two travellers met at the airport at Cheyenne, Wyoming. One was Pete Sandretto, coming in from the West Coast with his big twin-engined "flying laboratory," the Boeing flight research ship of United Air Lines.

From the East Coast, aboard a transcontinental airliner, came Newhouse—and the new radio altimeter. In the big hangars of United's overhaul base, skilful mechanics carefully installed the new radio magic, tested its simple controls.

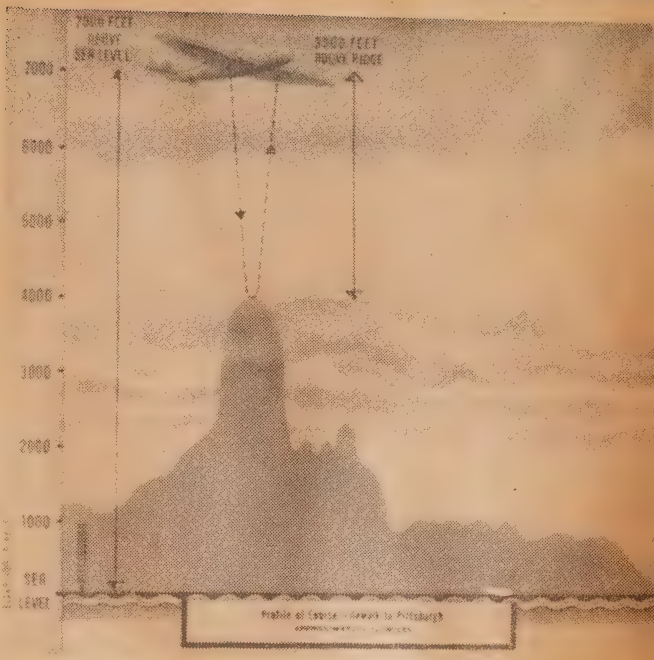
Then came the fulfilment of nine years of planning, working, waiting. The big ship roared down the runway, climbed in a graceful turn, levelled off. The old-fashioned aneroid altimeter showed 8500 feet—above sea level.

In the cabin, Newhouse and Sandretto simultaneously reached for the switch which puts the radio altimeter into operation. The radio altimeter showed 2355 feet—**above the airport!**

The airport at Cheyenne is 6145 feet above sea level. But the sea level lies 1034 miles away to the west, 1599 miles away to the east. Of course, every pilot knows that the Cheyenne airport lies at 6145 feet above sea level, but . . . Forty miles westward, in the Laramie

RIGHT—

The reflected wave can give the exact height above the ground itself. The standard altimeter only indicates height above sea level.



☆

Range, towers the snow-capped 8013ft. Sherman Hill. The "flying laboratory" wheeled about and headed for it.

In the foothills the pointer of the radio altimeter began crawling towards zero, flashed a red warning light when it dropped below 1000 feet, and, as the forbidding peak slid beneath the wings of the big Boeing, the pointer read: 487 feet. The aneroid altimeter still read 8500 feet. And that was that!

THE APPARATUS

Physically, the apparatus consists of a simple UHF oscillator, a corresponding receiver, and a common power unit, installed out of the way in the radio compartment and remotely controlled by the pilot.

Underneath the aeroplane are two small T-shaped antennae, each in a streamlined dielectric housing: one transmitting, the other receiving. The antennas, centreing dipoles, are each just a foot long, set about six inches away from the wing.

In front of the pilot, housed in a standard 3½-inch diameter aircraft instrument case, is the indicator, calibrated in feet, with a range from 0 to 5000 feet. A small toggle switch on the instrument board puts the altimeter in operation; its operation is automatic, continuous and instantaneous—if you will neglect that infinitesimal fraction of a second that it takes for the radio signal to travel from the aeroplane to the ground and back again. Complete and installed, the altimeter weighs just about forty pounds.

Now, this is the way it works. The frequency of the transmitter is being rapidly "wobbled," up and down, 60 times per second, by a motor-driven modulator consisting of a small rotating variable condenser. The modulator is so arranged that the frequency change which it produces is **linear.** If we plot the frequency variation on a graph, we will get a straight-line saw-tooth pattern, as shown in the diagram, in solid line. Each complete "tooth" represents the change of frequency from 420 to 445 and back to 420 mcs., taking place in 1-60sec.

REFLECTED SIGNAL

That signal is directed towards the ground by one of the two antennas underneath the wing, with the wing acting as a reflector. When it reaches the ground, it is reflected back into space, and is picked up by the other antenna and fed to the receiver.

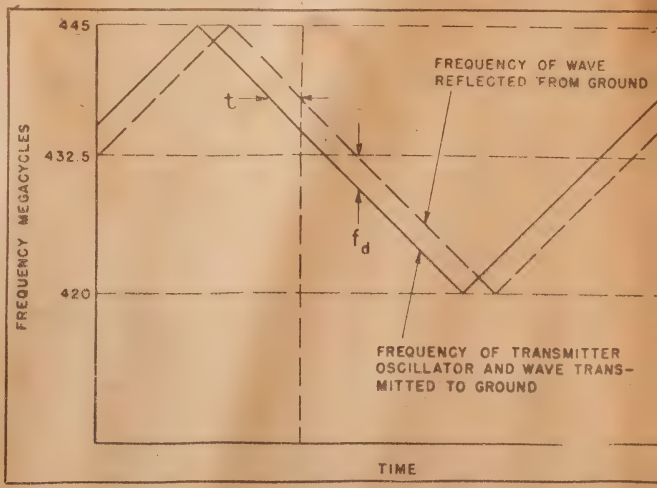
Now, if we will plot the received signal on the same graph as the transmitted signal, it will obviously have the same straightline saw-tooth pattern, but will take place a little later. In other words, **the pattern of the received signal will be shifted in time.**

The amount of that shift shows how long it took the radio waves to travel from the aeroplane to the ground and back again. If we can measure the amount of the shift, we will know our altitude: because radio waves propagate at a constant speed.

We can measure the amount of the shift, **at any instant,** by measuring the instantaneous difference between the transmitted and the received frequencies.

The amount of the shift is measured electrically, and the measuring process is automatic and continuous. A portion of the transmitted signal is to a special radio tube, where it mixed with the received wave; in other words, we "beat" the received w with the transmitted wave.

The instantaneous difference betw the two frequencies, constant for a gi height, sets up an interference in radio tube; and the greater the quency difference, the greater is interference. The electrical current t produced, proportional to the amo of interference, moves the pointer the radio altimeter indicator--an ord ary milliameter calibrated in feet.



This graph, referred to in the article, illustrates the theory of the radio altimeter.

A.V.C. IN THEORY AND PRACTICE

BY

F. LANGFORD SMITH

B.Sc., B.E.

A.V.C.—Simple A.V.C.—Delayed A.V.C.—Differential distortion—Methods of feed—Series feed—Shunt feed—Maximum resistances in grid circuits—Typical Circuits—A.V.C. Application—Amplified A.V.C.—Audio A.V.C.—Modulation rise—A.V.C. with battery valves and zero bias—Special case with simple A.V.C.—Time constants—A.V.C. Characteristic Curves.

AN automatic volume control is a device which automatically reduces the total amplification of the signal in a radio receiver with increasing strength of the received signal carrier wave. In practice the usual arrangement is to employ valves having "super control" or "variable-mu" grids and to apply to them a bias which is a function of the strength of carrier. A.V.C. systems may be divided into simple A.V.C. and delayed A.V.C.

SIMPLE A.V.C.

In order to obtain simple A.V.C. it is only necessary to add resistor R4 and condenser C4 to the ordinary diode detector circuit shown in Fig. 1. In any diode detector there is developed across the load resistor (R1 and R2 in series) a voltage which is proportional to the strength of carrier at the diode. The diode end of the load resistor is negative with respect to earth (Fig. 1) and therefore a negative A.V.C. voltage is applied to the controlled grids. R4 and C4 form a filter to cut out the audio component and leave only the direct component.

Since a condenser in series with a resistance takes a finite time to charge or discharge, the A.V.C. filter circuit has a "time constant." The time constant of R4 and C4 is equal to R4 . C4 where R4 is expressed in megohms and C4 in microfarads, the time being in seconds. For example, if R4 is 1 megohm and C4 is 0.25 mF. the time constant will be 0.25 second. In this circuit the time constant is also influenced by R1 during the charge and by R2 during the discharge, but since R1 is small compared with R4 it will be sufficiently close for practical purposes to regard R4 . C4 as giving the time constant.

LESS THAN CARRIER VOLTAGE

It is evident that the peak voltage on the diode is equal to the A.V.C. voltage for 100 per cent. rectification efficiency. Owing to losses, the A.V.C. voltage is always slightly less than the peak carrier voltage, and since in general a higher voltage is required for the A.V.C. than for detection, this forms a limitation of simple A.V.C.

With critically coupled circuits of equal L, C, and Q, the voltage across the secondary is equal to the voltage across the primary. When a transformer designed for critical coupling under light loading conditions is used to drive the diode the ratio of secondary to primary voltage may fall to 0.7 or even 0.5. This is due to the fact that the additional loading on the secondary has reduced the coupling considerably below the critical value.

DIODE LOAD CIRCUIT

The diode load consists of R1 and R2, in series, R1 being used for filtering purposes to remove the major part of the R.F. component in conjunction with condensers C1 and C2, while R2 is frequently spoken of as the "volume control." R2 is shunted at audio frequencies by means of R4, C4, and also by R3, C3, when the volume control is set at maximum. Since the reactances of C3 and C4 may be neglected compared with the resistances R3 and R4, the effective A.C. shunt load with the volume control at maximum is equal to the resultant of R3 and R4 in parallel. At a low setting of the volume control the effective shunting is mainly that due to R4. This shunting has a considerable effect on harmonic distortion, and measurements show that when R2 is 0.5 megohm and R4 1 megohm, the resulting total harmonic distortion is 23 per cent. for 100 per cent. modulation at 400 c/s. This value of distortion is due to the shunting by R4 alone, and still higher distortion would occur with the volume control at maximum when the shunting would be that of R3 and R4 in parallel.

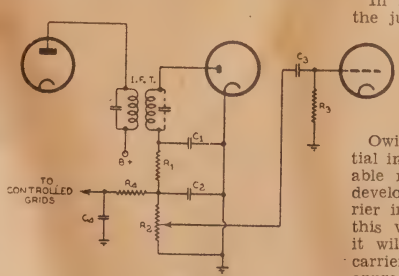


Figure 1

Simple A.V.C. circuit using the voltage developed across the diode load to control the R.F. amplifiers.

NOISY CONTROL

It is found that there is a tendency for noise to occur when the volume control (R2) is moved. This is due to the direct current flowing through it, and may be avoided by placing the volume control in the position of R3. However, the distortion due to this arrangement is severe, as already indicated, and any considerable reduction of the distortion necessitates a high ratio R3/R2, say, 5 : 1 or more. This is not always practicable, and the slight noise due to movement of the volume control in the position (R2) as shown may be tolerated in preference.

In Fig. 1 R4 is shown connected to the junction of R1 and R2, but if desired it could be connected to the top end of R1 in order to obtain slightly greater A.V.C. voltage. Since R1 is comparatively small, it is immaterial which arrangement is adopted.

Owing to the effects of contact potential in the diode, together with unavoidable noise voltages, there is a voltage developed across R2 even with no carrier input. With a weak carrier input this voltage is increased. Consequently it will be seen that with the weakest carrier likely to be received there is an appreciable negative voltage which would be applied to the controlled grids. If no means were taken to compensate for this, there would result a decreased sensitivity of the receiver. Fortunately it can readily be compensated for by applying a lower minimum negative bias to the controlled stages.

DELAYED A.V.C.

The "delay" in delayed A.V.C. refers to voltage delay, not time delay. A delayed A.V.C. system is one which does

not come into operation (i.e., it is delayed until the carrier strength reaches a pre-determined level. The result is that no A.V.C. voltage is applied to the grids of the controlled stages until a certain carrier strength is reached. Delayed A.V.C. necessitates the use of two diode anodes, although a common cathode may be used.

Delayed A.V.C. makes possible improved rectification efficiency in the A.V.C. circuit, thus producing slightly greater A.V.C. voltage for the same peak diode voltage. This is on account of a higher value of A.V.C. diode lead resistance (R7 in Fig. 2). With the arrangement shown in Fig. 2 a higher voltage is applied to the A.V.C. diode D2 than to the detector diode D1 because D2 is coupled through a small condenser C7 to the primary of the I.F. transformer. Since the voltage across the primary is greater than the voltage across the secondary, this gain is quite material. C7 should be a very small capacitance, and 100 mmF. is frequently used; the insulation of this condenser is extremely important. A further advantage of this arrangement of delayed A.V.C. is that the shunting due to R4 is removed from the secondary circuit of the I.F. transformer. Owing to the shunting effect of R4 on R7, there will be some distortion of the modulated carrier voltage at the primary of the transformer, which will be passed on to the secondary. It seems, however, that this distortion is much less serious than that due to A.C. shunting in the secondary circuit. With this arrangement, since the overall selectivity up to the primary of the I.F. transformer is less than at the secondary, the A.V.C. will commence to operate further from the carrier frequency than if fed from the secondary.

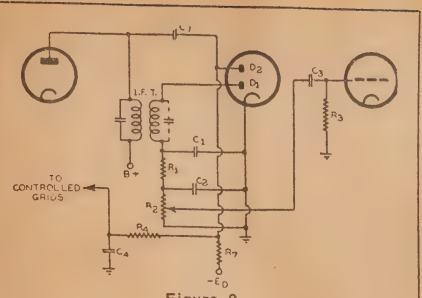


Figure 2

A.V.C. circuit using separate diode and a delay voltage.

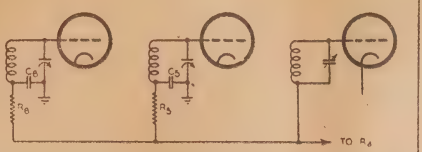


Figure 3

One form of series feed.

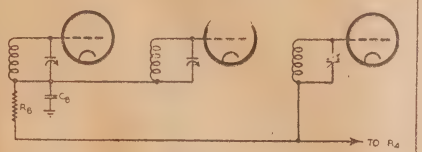


Figure 4

Alternative series feed with the gang completely insulated from the chassis.

ALTERNATIVE FEED

The A.V.C. diode is sometimes fed from the secondary of the I.F. transformer instead of from the primary. This results not only in a decreased A.V.C. voltage, but also in serious shunting of the detector diode load.

Differential distortion is frequently mentioned as a serious disadvantage inherent in delayed A.V.C. Careful measurements have shown that the additional distortion occurring just as the A.V.C. diode commences to conduct is quite small provided that the delay voltage is small. With a delay voltage (Ed., Fig. 2), of three volts the total harmonic distortion was found to increase from an average level of about 2.5 per cent. to a peak of 4 per cent. Not only is the amount of distortion fairly small but it only occurs over a limited range of input signal which with a small delay voltage such as 3 volts or less, occurs at such weak signal strength as to be unimportant. A slight increase in distortion on weak signals is not generally regarded as a serious detriment. From all the evidence available, it appears that the effect of differential distortion is a comparatively minor one when the circuit is correctly designed, but the importance of the small delay voltage cannot be too strongly stressed.

If it is desired to apply full A.V.C. voltage to certain controlled stages and a fractional part only to another stage, this may be done by tapping R7 at a suitable point and by adding a similar filter to that of R4 . C4.

The time constant of the circuit shown in Fig. 2 is equal to R4 . C4 during charge and (R4 plus R7) C4 for discharge.

TAPERED CONTROL

When a duo-diode-triode or a duo-diode-pentode amplifying valve is used with cathode bias the value of the bias is usually between 2 and 3 volts. Such a voltage is suitable for A.V.C. delay; a very simple arrangement is possible by returning R7 to earth as in Fig. 7. If back bias is used R7 must be returned to a suitable negative voltage.

METHODS OF FEED

The A.V.C. voltage may be fed through the secondary of the R.F. transformer to the grid of the valve (sometimes called "Series Feed") or directly to the grid, and therefore in parallel with the tuned circuit (sometimes called "Shunt Feed"). In the latter case it is necessary to a blocking condenser between top of the tuned circuit and grid, to avoid short-circuiting A.V.C. voltage. Note that the of the terms "Series" and "Shu has no bearing on the type A.V.C. filter circuit which m be series, shunt, or a combinat of both. The two types of A.V feed circuits are considered further detail.

(a) Series Feed.

One arrangement of series f is shown in Fig. 3 and it will seen that in each R.F. tuned c cuit a blocking condenser (C6) is used so that the rotor the ganged condenser may earthed and the A.V.C. voltage to the lower ends of the coils. the R.F. stages the use of t blocking condenser will reduce band coverage and for this reas a high capacitance is desirable. the other hand a high capacitar increases the time constant whi is approximately equal to (C4 pl C5 plus C6) multiplied by the r sistor R4 (Fig. 2). The sum these capacitances (C4 plus plus C6) is usually between 0. and 0.25 mF. The restriction the tuning range may readily calculated by considering the ma mum capacitance of the gang condenser in series with the bloc ing condenser. Resistors R5 ar R6 are generally each made abo 100,000 ohms, and are intended provide decoupling between the respective circuits.

The semi-variable condenser the grid circuit of an I.F. sta need not be earthed, and there therefore no necessity for a block ing condenser in this circuit. Th condenser C4 (Fig. 2) serves bypass all high-frequency componen from the lower side of the tuned circu of the I.F. stage to earth, as well being part of the A.V.C. filter.

(b) Shunt Feed

An alternative arrangement is to in sulate the rotor of the ganged conden ser and to bypass it to earth by a singl condenser (C6, Fig. 4). This enable the A.V.C. voltage to be applied with out any blocking condenser in the R.F tuned circuits, and has the further ad vantage that the time constant of th A.V.C. circuit may be made very short but the arrangement has obvious dis advantages and is little used.

The "shunt feed" circuit is shown i Fig. 5. In this arrangement the block ing condenser is not placed in th tuned circuit, but in the grid circuit It is therefore necessary to employ a suitable value of grid leak (for ex ample 0.5 megohm) in order that th A.V.C. voltage may be applied to the grid. This grid leak will introduce a certain amount of damping on the tuned circuit, but the damping of a 0.5 megohm resistor on a typical tuned R.F. circuit is negligible. The effect on the I.F. circuit is greater, but it is pos sible to use a combination of shunt feed for the R.F. stages and series feed for

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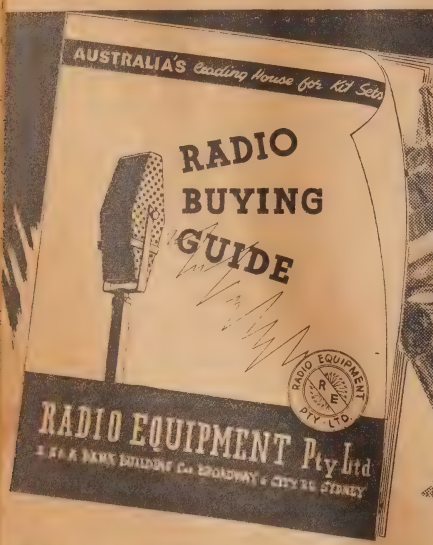

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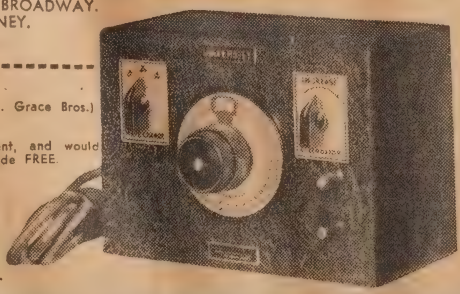

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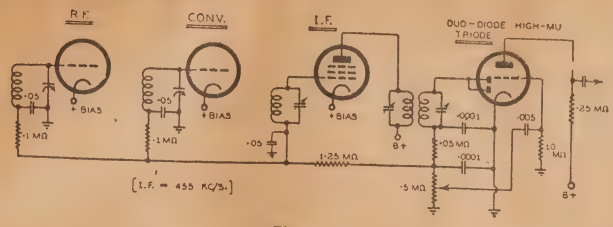


Figure 6

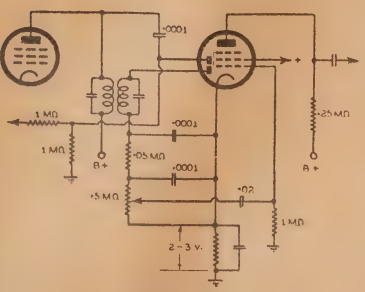


Figure 7

Fig. 6—Typical circuit for A.V.C., using the simple method controlling two stages. Note the "grid leak" bias used on the duo-diode valve. The circuit values given are suitable for all standard valves.

Fig. 7—This circuit shows delayed A.V.C., using separate diode and duo-diode pentode detector. See article for further details.

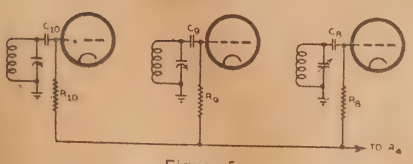


Figure 5

Fig. 5—A.V.C. circuit with "shunt feed." This system avoids the use of fixed condensers in the tuned circuit of the controlled stages. Damping effect of the grid resistors (.5 megs.) is negligible at tuning frequencies.

the I.F. stage if this is desired. Shunt feed for the R.F. stages is sometimes more convenient than series feed and appears satisfactory in most respects, although it has been found that grid blocking is more likely to occur with shunt feed than with series feed. For this reason shunt feed is only recommended in cases where grid blocking is not likely to occur.

With any method of feed it is important that the total resistance in the grid circuit should not exceed the maximum for which the valves are rated. The valve manufacturers give the following as recommended maxima:—

For one controlled stage, 3 megohms.

For two controlled stages, 2.5 megohms.

For three controlled stages, 2 megohms.

These resistances are to be measured between the grid of any valve and its cathode.

TYPICAL CIRCUITS

A typical circuit of a simple A.V.C. system with three controlled stages, using a duo-diode high-mu triode valve, is shown in Fig. 6. In order to provide the simplest arrangement the cathode of the duo-diode valve is earthed and its grid obtains bias by the grid leak method using a resistor of 10 megohms This places the minimum additional shunting on the diode load resistor. The cathodes of the controlled stages should be returned to a positive voltage such that under working conditions on a weak carrier the grid voltage is equal to the recommended minimum grid voltage for the valves. For I.F. equals 455kc., the two R.F. bypass condensers on the diode load are each made 0.0001 mF. An A.V.C. resistor of 1.25 megohms is used so that the total resistance to earth from any grid does not exceed 2 megohms. If there were only two controlled stages this could be increased to 1.75 megohms with consequent decreased A.C. shunting. The time constant for this arrangement is approximately 0.15 x 1.3 or 0.195 second for charging.

A circuit of a typical delayed A.V.C. stage using a duo-diode-pentode valve is shown in Fig. 7. Self-bias is used and, since the bias will normally be from two to three volts, this provides a suitable A.V.C. delay voltage without any further complication. The condenser from the plate of the I.F. amplifier to the A.V.C. diode is 0.0001 mF., and should not be increased above value. With this arrangement A.V.C. bias on the controlled valv zero until the peak voltage on A.V.C. diode exceeds the delay vol The controlled stages would norm be arranged with self-bias equal to recommended minimum bias.

A.V.C. APPLICATION

A.V.C. is normally applied to converter on the broadcast band. spective of valve type. On the sh wave band some types of conver give very satisfactory operation A.V.C., while others introduce diffi ties. When no R.F. stage is used essential to apply A.V.C. to the verter, but when an R.F. stage is it is frequently advantageous to ope valve types 1A7-G, 1C7-G, 6A8-G, 6D8-G on fixed bias. Valve 6J8-G, 6K8-G and 6SA7 may be with A.V.C. on all wave bands.

In a receiver having an R.F. st converter and single I.F. stage A.V.C. is normally applied to all t stages. If decreased modulation is required it is preferable to ope the I.F. stage with about one-half full A.V.C. bias or alternatively to s ply its screen from a dropping resis If A.V.C. is applied to both R.F. Converter stages on all wave-bands is possible to omit control of the stage without losing much of the ef tiveness of the A.V.C. system, with result that modulation rise is ne gible.

In a receiver without an R.F. stag is difficult to avoid overloading heavy input signals, and A.V.C. is plied to both stages even though mo lation rise may be objectionable very high inputs. In order to ob maximum control the screen of the valve would normally be supplied fro voltage divider.

RECEIVER WITH TWO I.F. STAG

In a receiver having two I.F. st the second I.F. stage should prefer be operated at fixed bias in order reduce the modulation rise. Since effectiveness of control on any stag proportional to the gain from its to the A.V.C. diode it is obvious control on the R.F. stage is n valuable, while control on the stage is least valuable from the con point of view. The final I.F. ampli operating at fixed bias, may in fact regarded as an amplifier for the A. voltage, and in many ways the ope tion is similar to amplified A.V.C. cept that in this case the amplifica takes place before rectification. It for these reasons that when two stages are available the second is n

(Continued on Page 75)

This splendid article has been reprinted from the new "Radiotron Designer's Handbook," by permission of the publishers. This Handbook, which is now on sale, has already been reviewed in our columns. We felt the best we could say of it would not be as effective as the book itself. From this extract, one may obtain an excellent idea of its exhaustive treatment, and lucid style.

An ELEMENTARY RADIO COURSE for beginners

ng a very elementary course of Radio study for those who wish to know "what makes the wheels go round."

L. B. GRAHAM, Principal of the Australian Radio College, Pty.

In this article will be found a discussion of the two main types of radio tuners—the T.R.F. receiver and the Superheterodyne. The advantages and disadvantages of each are outlined, together with a simple explanation of the superheterodyne action.

N the early days of radio, when valves were first used in receiving sets, the "tuned radio frequency" type of amplification was used exsively. Later, the superheterodyne th its greater gain and freedom from illation became popular.

With the introduction of ganged consers and the increase of stations on e air, the tuned radio frequency type ce more became popular and mainned its popularity until about ten rs ago.

ELECTIVITY

The second "fade out" of the T.R.F. ceivers resulted when stations became numerous that they could only be lowed a band width of 10kc. on the oadcast band, and without introducg very high cost, the T.R.F. could not lect stations separated by such a nall amount.

The superheterodyne once more beme popular, and has not looked back ace. The principal differences in a .R.F." and "Superheterodyne" are own in the block diagrams in Figure

The "T.R.F." receives the station's equency from the aerial and amplifies at frequency in each succeeding stage, ntil it is detected by the detector ube. The super. receives the signal om the aerial, changing it to a lower requency in the frequency changer and scillator tube. The intermediate frequency amplifier amplifies this lower requency before it is passed on to the etector tube.

The detector and audio frequency tages of the two types may be identical in circuit and operation.

FREQUENCY CHANGE

The "lower frequency" obtained from he frequency changer tube is known s the intermediate frequency. All requencies tuned in by the receiver re changed to the one intermediate requency. All the remaining tuned ircuits are tuned to resonate at this requency.

The intermediate frequency is obtained by mixing two different frequencies in the frequency changer tube. One of these frequencies is that transmitted from the broadcasting station, the other is provided by an oscillator which is part of the receiver itself.

In the older types of supers. a separate tube performed the function of oscillating. Modern types of sets use one tube to perform both functions.

The grid circuit of the frequency changer tube, which is more commonly known as the first detector, is tuned by the ordinary type of condenser and radio frequency coil. The oscillator section is tuned in a similar manner, but to a frequency that is different from the station's frequeucy by the intermediate frequency.

The frequency from the oscillator section is fed to the grid circuit of the first detector by means of a coupling coil or some similar arrangement. The two frequencies cause variations in grid voltage and vary the plate current of the tube accordingly.

FOUR FREQUENCIES

The first detector tube is made to act partly as a detector and four different frequencies are present in its plate circuit. These frequencies are: The two originals, the sum of the two originals, and the difference of the two originals. To give an example of this. If the station's frequency is 1000kc., and the oscillator frequency is 1465kc., the frequencies appearing in the plate circuit will be 1000kc., 1465kc., 2465kc., and 465kc. Of these frequencies the lowest frequency, in the above example, 465kc., would be chosen as the intermediate frequency.

When a station is required the coil and condenser in the grid circuit would be tuned to the station's frequency. The oscillator circuit would be tuned to a frequency 465kc. above the station's frequency, allowing the intermediate of

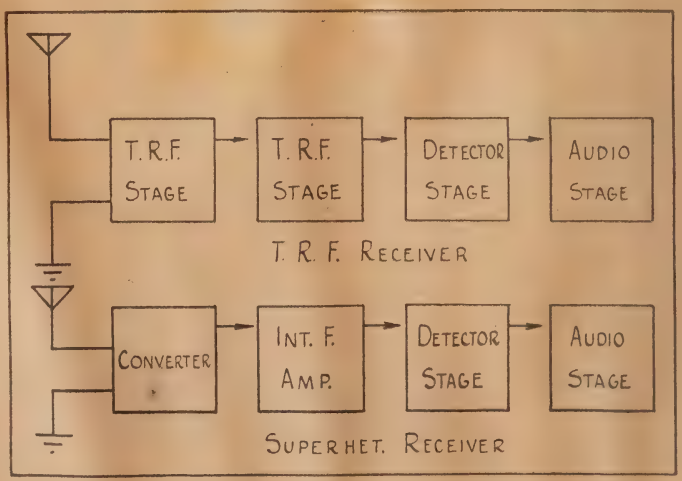
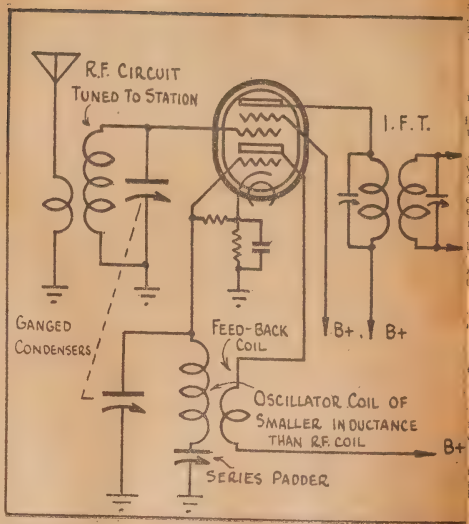


FIGURE 1.
This diagram illustrates in block form the essential units of the T.R.F. and Superheterodyne receivers.

465kc. to appear in the plate circuit of the tube.

It is quite easy to understand how three of these four frequencies appear in the plate circuit, but it is a little more difficult to understand how the fourth and lowest frequency is produced.

When two frequencies are combined in a tube which is acting as a detector, the hills and valleys of one combine with the hills and valleys of the other. If these two frequencies are different from one another the hills and valleys of each do not coincide exactly with the other and the result, as shown in Figure 2, is that the hills of the combined output vary at a rate which is equal to the difference between the two. This variation of peaks is the fourth frequency and is known variously as the beat, heterodyne or intermediate frequency.



A typical superhet. converter circuit as used at the present day. Two tuned circuits are employed—one at the signal frequency, and one at a frequency 465 k.c. higher. These two are "mixed" in the converter. The result and "beat frequency" is fed to the intermediate channel for further amplification.

GANGED CIRCUITS

In modern receivers the tuning of the oscillator and grid circuit is carried out by two similar tuning condensers ganged together. The condenser tuning the oscillator circuit must tune to a higher frequency and over a smaller range than the one in the grid circuit. By range is meant the ratio of change —not the actual frequencies covered. To illustrate this: The broadcast band stretches from 550kc. to 1500kc. This represents a change of 950kc. and a ratio of change of 550 to 1500, or approximately 2.72 to 1. The oscillator frequency, if the intermediate is 465kc., stretches from 1015kc. to 1965kc. This again represents a frequency change of 950kc., but the ratio of change is reduced to approx. 1.94 to 1.

To tune the oscillator section with the same type of condenser as in the grid circuit, the inductance of the coil must be reduced considerably to tune to a higher frequency, and the ratio of change of the condenser must be reduced.

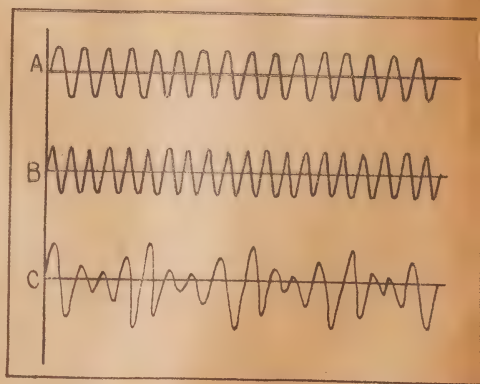


Figure 2: A graphical illustration of combining two frequencies as in a superhet. (a) Represents the station's frequency. (b) Shows the oscillator frequency. (c) This illustrates the combined frequencies after mixing The peaks represent the beat or intermediate frequency of 465 k.c.

PADDING CONDENSER

The reduction of range is carried out by inserting an adjustable condenser known as the padder in series with the oscillator section of the gang. This has the effect of reducing the maximum capacity considerably, but has very little effect on the minimum capacity, thus reducing the condenser's range.

The use of an oscillator coil of lower inductance, and a padding condenser, allows the oscillator section to tune to the station's frequency plus the intermediate frequency, regardless of whether the tuned circuit in the grid circuit is tuned to a low or high frequency. These points are illustrated in Figure 3.

As the frequency of each station tuned in is changed to one intermediate frquency, the remaining tuned stages of the receiver can be set to this frequency and left unaltered.

THE I.F. TRANSFORMER

In the plate circuit of the first detector tube is a tuned circuit consisting of a coil and adjustable condenser, which is tuned to resonate at the desired intermediate frequency. Of the four frequencies previously mentioned as existing in the plate circuit, the intermediate or lowest frequency is the only one accepted by the tuned circuit. The others pass through the coil and condenser with little opposition, and are bypassed to earth by means of condensers connected from B plus to earth.

The passage of current, at the intermediate frequency, passing through the coil of the tuned circuit, sets up lines of force which induce a voltage in the secondary of the intermediate frequency transformer. This secondary is tuned in a similar manner to the primary, and voltages of the intermediate frequency are applied to the grid of the intermediate frequency amplifying tube. A second intermediate transformer is used in the plate circuit of this tube in a similar manner to the first one.

SINGLE VALVE CONVERTER

As mentioned in the beginning of this article modern receivers use one tube combining the action of the first detector and oscillator. This may be the form of a single tube used as a autodyne, or two tubes in the one glas one section oscillating, the other se tion mixing.

The autodyne system is used wit such tube types as the 57, 6C6, &c., is a system whereby some of the sign energy in the plate circuit is fed bac by means of a coil to the grid circu of the same tube. The autodyne sys tem has been almost entirely replace by that using the pentagrid converte of octode type tubes. In these system the oscillations set up in the triod section of the tube are coupled to th mixer section by the electron strea inside the tube itself.

In the design of superheterodyne re ceivers, it is a common practice to us a radio frequency amplifying stag ahead of the first detector. This stag is identical in circuit and operation t the R.F. stages in a T.R.F. receive and does not in any way alter th action of the superheterodyne.

SERVICE

THE SERVICE-MAN WHO TELLS

By A Service Engineer Of
Radio Equipment Pty., Ltd.

In these days when money seems more precious than ever, few of us like paying more than is absolutely essential when purchasing an article. The fact that the lowest priced article is not always the cheapest in the long run applies particularly to radio pilot lamps, and has been impressed on a customer who phoned me regarding his radio set.

NUMBER ONE

THE customer's complaint over the phone was that there must be something wrong with his set, because every time he replaced the dial lamp it only lasted for a few hours and then burned out.

He had been careful to replace the lamp with those of a similar voltage rating to the original, so that the lamps themselves should not have been overloaded. In spite of this, they continued to burn out one after the other with annoying regularity.

On checking over the set the first thing I noticed was that the lamps he had been using were of an inferior quality, and were rated at 2.5 volts. On measuring the actual voltage applied to the lamps this proved to be just a shade under 2.5 volts, so that the lamps were not actually overloaded. The type of lamps he was using, however, was the small round bulb type, which are really intended for use in electric torches.

LIFE OF TORCH BULB

Most people are unaware of the fact that a torch lamp is only designed to have a life of about 10 hours' continuous burning. This is due to the desirability of having a lamp which will produce a very bright light, and life is sacrificed in an effort to obtain bright illumination.

As torch lamps are only designed to have a life of about 10 hours when operating on their recommended voltage, it is natural to expect them to only work for this time in a radio receiver, and this accounted for the annoyance of the radio set owner.

I pointed out to him the fact that the correct lamps for this sort of work are usually tubular in shape and are known as radio panel lamps. These lamps are designed to have a life of about 1000 hours when operating on their rated voltage, and if he had purchased these in the first place he would not have been troubled by the frequent burning out.

His reply was the fact that the correct types of lamps are about six times as expensive as the cheaper ones, but it did not take long to convince him that cheap lamps in this case were poor economy.

Another method of getting over the trouble is to use ordinary torch lamps, but only to operate them at between 60 per cent. and 70 per cent. of their rated voltage. Under these conditions a lamp which will have a life of only 10 hours at its rated voltage will have a life approaching 1000 hours under reduced voltage.

A 3.5 volt torch lamp will have quite a reasonable life when operating on 2.5 volts, because 2.5 volts is only 71 per cent. of 3.5, and this reduction in voltage considerably prolongs the life of the lamp. In the case of tubular radio lamps, there is no need to allow a margin such as this, because they are initially designed to have quite a long life.

Incidentally, while on the subject of lamps, I have noticed recently that the pilot lamps in many radio receivers flicker considerably, due to the slightest mechanical vibration, either from the loudspeaker of the set or from a person walking near the receiver. This trouble is nearly always caused simply by the fact that the lamp is loose in its socket. All that is necessary is to screw up the lamp as tightly as possible in its socket, and it will probably be found that all the flickering disappears. This is a very simple trouble and yet one which annoys quite a number of people.

RUN-DOWN BATTERIES

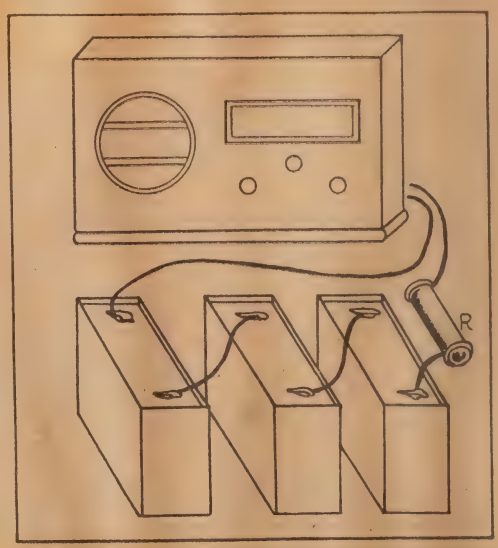
And here are a few points about batteries. Many faults in battery-operated receivers, such as motor-boating, squealing while tuning in stations, or inability to receive stations at the low frequency end of the band, are simply caused by run-down batteries.

As either the A battery or B battery becomes merely discharged, the internal resistance increases considerably, and this will often cause quite a number of complaints that disappear completely when the batteries are recharged or replaced.

Complaints of this nature are particularly frequent from persons who have just purchased a new radio receiver and whose batteries are running down for the first time. To them it is a new experience, and often one which occasions them a considerable amount of unnecessary alarm.

CASE IN POINT

A battery-operated portable receiver was brought in to me a few days ago, and when it was switched on, although it would work reasonably well, very bad



A good test for a battery set is to check its performance with a 2500 ohms resistor in series with the batteries. This takes the place of the resistance found in a set of run-down batteries. If the set still operates with no sign of instability it will probably perform well when the B battery is nearing the end of its life.

squeals and howls were experienced on tuning in stations.

All the shielding was in place, and apparently everything in the set was quite in order, so that one of the first things I did was to check up on the voltage of the A and B batteries.

Both batteries were partly discharged, and the two 45-volt B batteries actualiy had a voltage of less than 70 volts instead of a total of 90. On connecting a pair of new batteries to the set, it worked quite as well as ever without any signs of oscillation or squeals. This is a very simple complaint, and yet one which is often overlooked by the owners of battery-operated receivers.

Incidentally, whenever checking battery sets, I always find it a wise policy to connect a pair of almost flat batteries to the set to see how it behaves on a low voltage, or if there are no run-down batteries available I connect a wire wound resistance of about 2500 ohms in series with the B minus lead so as to reduce the battery voltage and duplicate conditions obtaining with run-down B batteries.

RESISTANCE TEST

The inclusion of the extra resistance in the circuit behaves in the same way as the internal resistance developed in B batteries when they become almost discharged. Most sets operate quite well with a resistance in circuit, although, of course, the sensitivity and the amount of power output is somewhat lower than it should be.

If any unusual squeals or oscillation are experienced a bypass condenser connected from B plus to earth in the case of run-down B batteries, or one across the filaments of the valves in the case of the run-down A battery, will often make quite a considerable improvement, and allow a set of batteries to be used for a much longer period of time than would otherwise be the case.

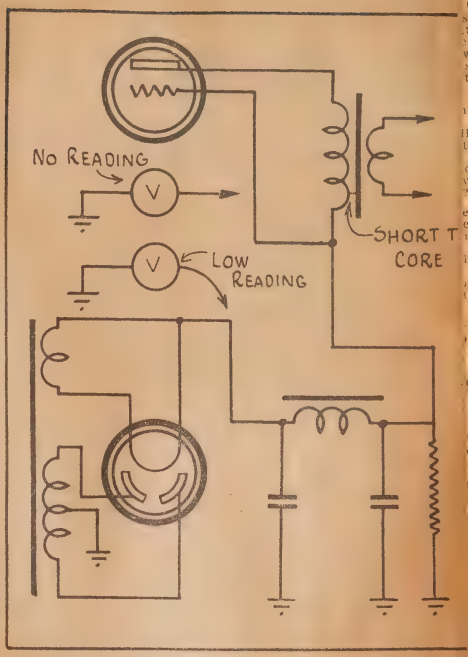
Some sets will cease to operate satisfactorily when the voltage of each 45 volt battery drops below 40 volts. Others will continue operating quite well when the voltage of each battery falls down even below 35 volts. The inclusion of adequate bypass condensers from B plus to earth and from the screen grids to earth usually assures that a reasonable life can be obtained from the B batteries.

NUMBER TWO

The service ambulance brought in another patient a few days back. It was an A.C. receiver, which when switched on was found to be quite "dead" However, it's our job to bring dead un's back to life again, so we set to work.

Removing the output valve from its socket, which should have interrupted its plate current and produced quite a loud click from the speaker, made no sound whatsoever. In removing the valve I also noticed that it was very cool, indicating that no plate current was flowing through it.

On checking up the voltages which existed in various parts of the circuit, I found that the output from the rectifier tube, instead of being approximately 400 volts, was only about 220, and that on the output side of the field coil the voltage, instead of being 250, was zero.



A short circuit to the speaker transformer core stopped this set from operating. Low high tension voltage was the first indication of the trouble. Systematic testing led to a final resistance check between windings and core to locate the fault. A new transformer or a new coil would put such a set back into service.

LOW VOLTAGE

The fact that the rectifier was giving a low voltage and that there was nothing at all coming from the output end of the field coil indicated a short circuit from B plus to earth. The fault could not have been simply an open circuit in the field coil, because the rectifier in this case would give a higher voltage than normal instead of a lower voltage.

On using an ohmmeter to check the resistance between B plus and earth, I found that there was no resistance at all, indicating a direct short circuit.

The next step was to check the different parts connected from B plus, one at a time, to find out in just which part the fault existed. After disconnecting one or two condensers and other parts, I decided to check the speaker itself. In this particular set the speaker framework was bolted directly to the chassis so that the two fitted into a midget cabinet.

In this case the framework was earthed and the insulation between the primary winding of the input transformer on the speaker and the core the input transformer had broken do causing a direct short circuit betwe the primary winding and the core. this way current from the power sup unit, after passing through the fi coil, was flowing to the damaged s on the transformer primary windi and from this spot through the fau insulation to the core, thence to t chassis, and thus forming a short c cuit.

REPLACING TRANSFORMER

One way of overcoming this trou would have been to replace the wh speaker transformer. A cheaper w however, was simply to obtain a n set of windings and to assemble th on the iron core of the transformer

Whenever ordering replacement win ings for speaker transformers, it essential to specify the type number the tube which is connected to t primary, and also to specify either t voice coil impedance of the speaker the make and model of the speaker, that a transformer having both t correct primary winding and seconda winding can be supplied.

Sometimes the customer thinks set has gone all haywire—sounds to h as if the hens have got into it. T trouble evidences itself quite frequent in both battery and A.C operated r ceivers by a scratching or crackli noise whenever the volume control turned. Some radio sets are fitted wi a volume control, which consists of wire-wound potentiometer, while others the potentiometer has a resis ance element composed of a deposit carbon on a piece of insulating materi

(Continued on Page 75)

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For the "De Luxe Five" Receiver, the R.C.S. Dual Wave Unit, Cat. No. DW29, illustrated, together with our Trolitul Litz Wound Intermediates, provides a combination unequalled for sensitivity, selectivity, ease of mounting, and maximum results, on both B/C and S/W Bands. You will be amazed at the quality of the results this unit will produce. Ask for Coil Kit Type K127. .. .. Retail Price, £2/2/6 Post Paid. Specify R.C.S. Dial Type DA1 .. .. .. Retail Price, £1/2/6 Post Paid.

R.C.S. "SIMPLE SIMON" KITS

The R.C.S. Kits for the "Simple Simon" have been designed to give the best possible results, combined with simplicity in assembling — the beginner will have no trouble if he uses R.C.S. parts for this set. Two Kits are available — we recommend the Foundation Kit of matched parts.

Kit of 2 coils, S.W. and B.C., Type K128 .. .. 13/-, Post Paid.

Foundation Kit, comprising:—

Type K128, S.W. and B.C. Coils	13 0
Type CV50 Tuning Condenser	9 0
Type CV40 Midget Condenser	5 11
Type TB4 Audio Transformer	2 0
Type RF86 R.F. Choke ..	1 0
Type R32 450 ohm Resistor	10

Ask for "Simple Simon" Foundation Kit, Type K129 £2 9 9

R.C.S. TROLITUL INTERMEDIATE TRANSFORMERS

Type IF107.

The new R.C.S. Trolitul I.F.'s are extremely stable, due to new methods of construction made possible by the use of Trolitul formers and base. No loose wires to shift and alter frequency. Positively the best I.F.'s yet produced.

Cat. No.	Retail Price.
Air Core, 465 k.c.	
IF107. 1st I.F. .	7/6
IF108. 2nd I.F. .	7/6
Iron Core, 465 k.c.	
IF109. 1st I.F. .	11/-
IF110. 2nd I.F.	11/-
Air Core, 175 k.c.	
IE68. 1st I.F. ..	7/6
IE69. 2nd I.F. .	7/6

R.C.S. TROLITUL BROADCAST COILS

These coils are available in both Air Core and Permeability tuned types. The latter are adjusted to ensure maximum efficiency in our laboratories.

Type E284.

Air Core.

Cat. No.	Retail Price.
E282. Aerial . .	6/6
E283. R.F. . . .	6/6
E284. Osc. . . .	6/6

Permeability.

E279. Aerial . .	8/6
E280. R.F. . . .	8/6
E281. Osc. . . .	8/6

R.C.S. TROLITUL MIDGET CONDENSERS

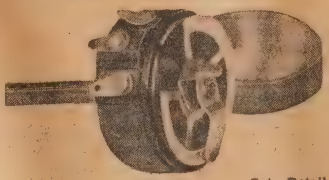
M.C. Type.

R.C.S. Midget Condensers are made in two types, using Trolitul supports, thus guaranteeing practically no loss.

STAR AND M.C. MIDGETS

Max. Cap. mmfd.	Min. Cap. mmfd.	Plates.	STAR Cat. No.	Retail Price.	M.C. Cat. No.	Retail Price.
10	3	2	CV34	3/6	CV41	6/9
15	3	3	CV35	3/9	CV42	7/3
25	3 5	4	CV36	4/-	CV43	7/10
35	4	5	CV37	4/3	CV44	8/6
50	4	7	CV38	4/9	CV45	9/-
70	5	9	CV39	5/4	CV46	9/6
100	6	14	CV40	5/11	CV47	10/3

R.C.S. POTENTIOMETERS AND RHEOSTATS



		Cat. No.	Retail Price.
6 ohm Rheostat	25 Amp.	PT40	5/-
10 " "	25 Amp.	PT38	5/-
20 " "	25 Amp.	PT39	5/-
50 " "	25 Amp.	PT34	5/-
" " Potentiom.	50 M A	PT46	5/-
1000 " "	35 M A	PT47	5/-
	30 M A	PT49	5/-
5000 " "	90 M/A	PT51	5/-
10000 " "	20 M/A	PT52	5/-
15000 " "	20 M/A	PT53	6/6
20000 " "	15 M/A	PT54	6/9

Type DA1.

NEW R.C.S. DIAL

The new R.C.S. Communications Dial was designed simultaneously with the 5-band coil unit, consequently the dial tracks with the coils and the H-type condenser.

DA2 Communications Dial 22/6
DA1 B/C Dial ("F" condenser) .. 22/6

Type G19.

R.C.S. TROLITUL DUAL WAVE COILS

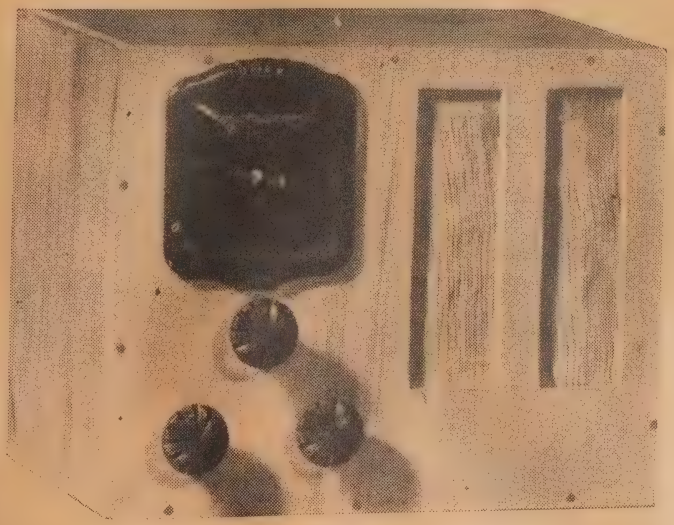
These coils have the B/C and S/W Trimmers incorporated. The Oscillator coil also contains the S/W Padder. S/W 16 to 50 metres. B/C 1500 to 550 k.c.

Cat. No.	Retail Price.
G19. Aerial Air Core	14/-
G20. R.F. Air Core	14/-
G21. Osc. Air Core	14/-

OBTAINABLE FROM YOUR LOCAL DEALER, OR DIRECT FROM

R.C.S. RADIO Pty. Ltd. 50 Glebe St., Glebe, N.S.W. 'Phone, MW2405.

SET SPECIALLY DESIGNED FOR BEGINNERS



No longer need a simple receiver be an awkard, ugly thing spread all over a work bench! There is no reason why the smallest set should not use the same principles of construction featured in larger receivers. A simple little cabinet you can make yourself gives this set a neat and workmanlike appearance. The batteries can be stowed away out of sight if desired.

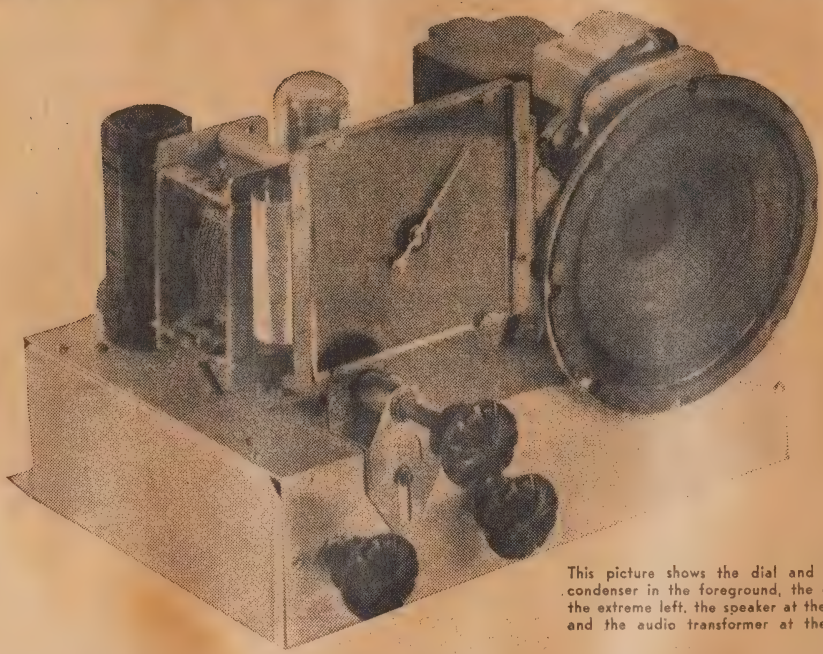
HOW TO BUILD

"SIMPLE SIMON"

Hundreds of readers have been waiting for "Simple Simon." A set which anyone at all can make—previous experience not required. Simon is so simple you just can't go wrong. And yet he has the goods! Plenty of volume and tone on local stations, which in a reasonable locality, should be free from interference. Short waves, too, just like a large dual-wave set. Speaker operation of course. What a test for your first receiver, designed and built the modern way!

JUST As SIMPLE To MAKE As YOUR A.B.C.

A SIMPLE ALL-WAVER ANYONE CAN BUILD



This picture shows the dial and tuning condenser in the foreground, the coil at the extreme left, the speaker at the right, and the audio transformer at the rear.

QUITE often we receive letters from readers which read somewhat like this: "I have recently become interested in radio, but know very little about it. I would like to build a small set. Could you suggest a suitable set and the easiest way to build it?"

Of course, not knowing the writer's ability, the difficulty in answering this question is apparent. Many of the sets so far described in "Radio and Hobbies" have been designed mainly for the average man with some idea of radio fundamentals, and not specially for the beginner. Consequently, many a novice has found a circuit we consider quite simple rather a puzzle.

WHY WE BUILT THIS SET

With this in mind, we realised there was a definite need for a small set to provide a "starting-off" point for the beginner. We wanted something cheap to build and operate, so that as many readers as possible would be able to build it.

It would have to be simple so that no constructional difficulties would confront even the veriest beginner, and yet be capable of reasonably good performance.

We consider that we have satisfied all these requirements and many more.

A FEW DETAILS

Before describing the actual construction, a few general remarks will not go amiss.

First we might comment on our method of describing this set. You will notice that this differs from our usual style both in the number of photographs and general details. We have done this so that the beginner can familiarise himself with all the parts.

Of course, many of the "seasoned" builders will probably think that all these photographs are unnecessary. However, as this set has been designed primarily for the beginner, we considered that to be of any value the article should describe every component fully, and take nothing for granted.

Now something about the set. It is a 2-valve battery type, using the new 1.4 volt valves, and is quite capable of working a loud-speaker at good volume. Now don't be misled and think that this set will pace along with your big 4 or 5 valve set, because it won't. However, anyone knowing the possibilities of a regenerative detector type of receiver will have a good idea of what to expect.

By using plug-in coils we have the option of hearing either the local or overseas short-wave stations.

Operated at Chatswood, all the Sydney stations were tuned in with plenty of signal strength, and without any overlapping. The aerial used was about 20 feet outside the window. An earth wire, of course, was also connected.

On short-waves the major overseas stations were heard with unusual clarity, and what's more, we didn't have to

A Personal Message

Although all "Radio and Hobbies" receivers must pass my own tests before being described I have spent extra time to convince myself that every statement in this article is true. I can give you my personal guarantee that Simple Simon is just about as foolproof as a set can be. The circuit and every component have been so thoroughly tested as to make success a certainty. I have heard all the Sydney stations on the loudspeaker at excellent tone and volume, as well as short wave stations on all the major bands, when conditions were suitable. I have measured the battery consumption and found it to tally exactly with the statements in this article. More than this, I cannot say to convince you that Simple Simon is everything we say it is!

THE EDITOR.

DESCRIBED HERE IN MINUTEST DETAI

Another front view from a different angle. You will recognise all the components shown in the picture on the opposite page.

"glue" our ears to the loud-speaker to hear them.

THE CIRCUIT

As previously mentioned, the set is a 2-valve battery type. We have used the new 1.4 v. valves mainly because of their economy. If you have any of the 2-volt battery valves on hand they can be used with suitable batteries. Types 30, PM2DX, PM1HL, &c., can be used in place of the 1G4G and 1D4, 1F4, PM22A, &c., for the 1Q5G.

The 2-volt valves will need high tension voltages up to 135 volts, whilst the 1.4 series are limited to 90 volts.

The 1G4G is used as a regenerative detector transformer—coupled to the 1Q5G, the pentode output valve.

A .5 ohm resistor is placed in series with the A plus filament lead. The reason for this is when the A battery is new the voltage is in the vicinity of 1.54 to 1.60 volts. This is too high for the 1.4 valves, so a resistor is needed to drop the voltage to the correct value.

Do not forget to include this resistor, otherwise the maker's 90-day guarantee on the valves will not be valid. After the battery has been in use for some time, this resistor can be shorted out, so that the filaments will still receive the full voltage.

REACTION

After some experiment we decided to use condenser reaction in this set. Lately we have been employing the variable resistor control. We have found it quite satisfactory, and if you prefer to use the variable resistor, there is nothing against it. It will work equally as well.

We have used a full size tuning condenser. This has been done to get full coverage on the broadcast band as well as on the short-wave band. If a smaller condenser than the one specified is used, a few stations may be missed out. The coils are the well-known "Duplex Single" type, available practically everywhere. If you wish to wind your own coils, we have included full winding data in this article.

AUDIO TRANSFORMER

We recommend that transformer coupling be used as it affords us the best gain. Resistance coupling would not be altogether suitable for this circuit. Since a really first-class transformer is not essential, it is possible t buy one quite cheaply and still obtai good results. Of course, the better th transformer the better the results. radio of 3:1 or thereabouts should b quite O.K.

PARTS LIST

BEGINNER'S TWO-VALVE SET

1 Chassis, 9 x 6 x 2½ in.
1 Single gang condenser.
1 Midget condenser, .0001 mfds.
1 Tuning dial.
1 Set tuning coils (see article).
1 .25 mfds. Electrolytic condenser.
1 .00025 mfds. mica condenser.
1 .0001 mfds. mica condenser.
1 2 meg. resistor.
1 .25 meg. resistor.
1 Audio transformer.
1 600 ohms W. wound resistor.
1 .5 ohm resistor.
1 R.F. choke.
1 Filament switch.
Sockets—2 octal, 1 5-pin, 1 4-pin.
Valves—1G4G, 1Q5G.
Batteries—2 45-volt PR45, 1 1.5-volt PR8.
Speaker—4in. Permagnetic matched to output valve.
2 Terminals, 3 knobs.

BIAS

Since we have been asked on numer ous occasions how to fit automatic bia we have included it on this set. It pro vides us with a change from the usua bias battery. The bias voltage is ap proximately 4½ volts, and though this deducted from the B battery voltag we have found this unimportant wit this set.

A "C" battery of 4.5 volts could b used in the normal manner if desire —results will be about the same.

THE PARTS

All the components used in the se are perfectly standard. Although th parts can be obtained in several differ ent makes, we do not recommend an one make as being better than another since they are all most reliable.

If the parts you buy do not loo exactly similar to those in the photo graph, don't be worried. Remember we can't photograph every make o the market. If you buy well-known products you should have no difficul ties.

THE BASE

Number required: One.
Type: Steel or aluminium.
The base for this set measures 9in. x 6in. x 2½in., and can be made either o

It may be a good fit . . . for SOMEBODY ELSE

You may spend a lot of money on the parts you buy for the sets featured in this issue—but are you SURE they'll fit? Why bother with "hit-or-miss" parts, anyway? JONMAR Fully-Matched Kit-sets are complete to the last piece of wire and solder lug, and they all fit! You save time, trouble, disappointments and MONEY, and get far better results into the bargain—write for details, NOW!

JONMAR KITSETS

for the "De Luxe Five" and "Simple Simon Set"

You get speedy, dependable service on all your purchases from "The Friendly Wholesale House"—as well as the Lowest Prices in the State. All standard components are stocked—fast delivery is a speciality!

Telegrams "Jonmar," Sydney. Telephone BW3109 (2 lines).

JOHN MARTIN PTY. LTD. RADIO & ELECTRICAL SUPPLIES

116-118 Clarence Street, Sydney

Rola "The World's Finest Sound Reproducers" are the only speakers that will give you the results you want. All latest developments are at their best in Rola.

FOR THE "DE LUXE FIVE"

K-8, 8 inch ... £1/14/6
F-10, 12 inch ... £2/-/-
K-12, 12 inch ... £2/10/-

FOR THE "SIMPLE SIMON SET"

8-14, 8 inch Permag ... £1/19/-
8-20, 8 inch Permag ... £2/6/-
8-21, 8 inch Permag ... £2/12/-

The "BIG 7" AMPLION

ELECTRICALLY WELDED LOUDSPEAKER

Newly designed and unsurpassed in efficiency, the new BIG 7in. Amplion Speaker supersedes 6½in. and 8in. types, and will handle outputs of 8 watts undistorted, and 12 watts maximum. Electric welding of the magnetic circuit guarantees efficiency found in no other construction. Special one-piece moulded fibrous cones, large over-size fields, and sealed impregnated transformers. The fidelity of the reproduction leaves nothing to be desired—this speaker definitely marks 1940's greatest advance in speaker production.

- Extended Frequency Range.
- Greater Output.
- Sealed Transformers.
- Complete Dustproofing.
- Larger Cone Areas.
- Only AMPLION Speakers are Electrically Welded.

ELECTRO-MAGNET TYPE, 7E12 ... ... 31/-

PERMAG 14oz. MAGNET TYPE, 7P14 .. .. .. 40/6

NEW 5" TYPE

With cone area 30 per cent. greater than any other 5-inch, this model will handle 3-5 watts. Oversize field coil, sealed insulated core transformer. The ideal speaker for portable and small sets, giving especially good bass response.

Electro Type, 5E7 .. 28/6

Permag., with 8oz. magnet, Type 5P8, ... 31/6

All Electro. and Permag. Types freely available from dealers throughout Australia.

AMPLION (A/sia.) Pty. Ltd.,
382 KENT ST., SYDNEY.

Please send me, without obligation, New Amplion Speaker Data, (Publication 88C), free and post-free.

NAME ...

ADDRESS ...

steel or aluminium. Although many will prefer to buy their chassis ready cut and drilled, we are sure that just as many will like to cut their own chassis.

For the benefit of those who will cut their own chassis (which, incidentally, should be aluminium, as a steel base would be too difficult to cut with ordinary household tools), we have drawn the wiring diagram to scale and all the essential measurements for the valve sockets, etc., can be obtained from this.

After marking out the position of all the parts, place them on the chassis just to make sure that they fit quite O.K.

By doing this you will avoid any difficulties that might crop up later by drilling holes in the wrong place.

The valve sockets are cut out first, and if our instructions are carefully followed you should have no difficulty in doing this.

CUTTING SOCKET HOLES

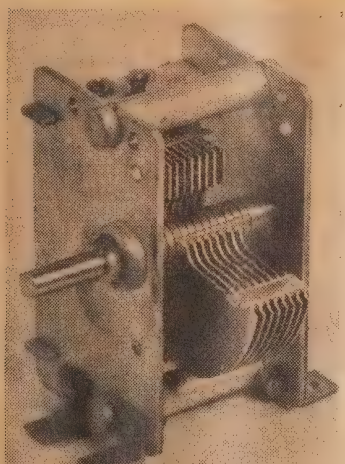
First drill the hole corresponding to the centre of the socket and then the two mounting holes, all with a 3-16in. drill. Then with a 1½in. wood bit held in a hand brace, scribe a complete circle, using the centre hole as a guide for the bit. Do not apply too much pressure.

By means of a small stick, drop some machine oil into this groove. This oil acts as lubricant for the bit and prevents the metal from "tearing."

Now by using a steady but not too heavy pressure, the bit is revolved, and will cut through the soft metal without any trouble.

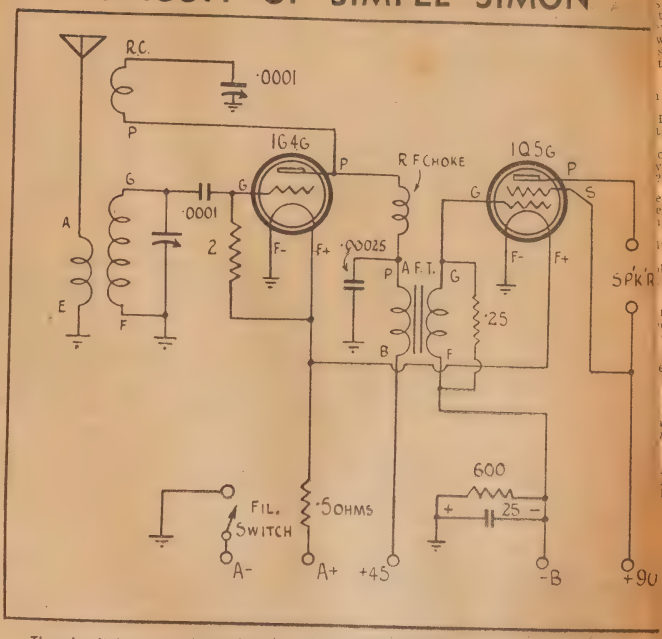
Before actually commencing to drill, it is a good policy to make sure that the cutting edge of the bit is quite sharp. Otherwise the metal will be torn away instead of being cut, and the result will be a very jagged hole.

The other valve socket holes are cut out in a similar way, not forgetting the one at the back of the chassis for the battery connections.



A typical tuning condenser as used in the set.

CIRCUIT OF SIMPLE SIMON



The circuit is purposely made a standard design, which has been tried and found reliable over many years. Modern valves and application have brought it right up to date.

Any rough edges that might be on the underside of the cut can be cleaned off with a sharp knife.

The other smaller holes can be drilled with a ¼in. bit and increased to the necessary size with a rat-tail file.

THE TRANSFORMER

The hole for the transformer will not be needed unless your transformer has the connections on the base. Some makes have screw terminals on the side for the connections, and consequently can be mounted to the chassis by merely drilling the mounting holes.

However, if the transformer has the base connections, make sure you cut the hole large enough to clear all contacts, otherwise short circuits may occur. The easiest way to cut this hole is to drill several small holes near each corner and join them together by means of knife cuts.

Then by fitting a hacksaw blade into the slot formed, it is quite easy to cut the rectangular piece out of the chassis.

With a flat file the rough edges can be trimmed up, and the hole can be enlarged if necessary.

The holes for the mounting bolts should then be drilled with a 3-16in. drill. Often when drilling these holes it is a good idea to mark the position of each hole with a centre-punch. This will prevent the bit from wandering around from its correct position.

Probably by now, after all this drilling and cutting, the shiny aluminium surface will be scratched. At any rate ours was, so we are taking it for granted that yours will be.

FINISHING THE CHASSIS

Now by rubbing down the chas with fine emery paper (probably abo grade No. 1 will do), and using wa as a lubricant, a dull finish can be o tained. In fact, it puts quite a profe sional touch to the chassis.

TUNING CONDENSER

Number required: One.

Type: Single gang with no tri mers.

One of the several makes of midget condensers suitable for this set. R.C.S. and Radiokes also make condensers which will work equally as well.

For Truly High Quality Reproduction . . . .

Rola K12

featuring

PERMACENTRIC CONSTRUCTION

Incorporating the most advanced features used in loud speaker construction, Rola K12 is the ideal sound reproducer for high quality receivers and amplifiers.

Note these interesting features:

- K12 covers an abnormally wide range of frequencies and gives truly faithful reproduction of speech and music.
- Of robust design. K12 can handle tremendous volume without distortion. Furthermore, it has that rare quality of maintaining full efficiency at high volume levels.
- Special low carbon steel in the magnetic structure, lighter and more responsive diaphragm, improved spider assembly and other important features have resulted in a speaker of abnormal efficiency, reflected in a greater sound output for a given signal input.
- Permacentric and riveted construction guarantee that Rola speakers will remain free from all service worries even under the most trying conditions. Isocore transformers are absolutely electrolysis proof and will stand up indefinitely under all climatic conditions. All Rola speakers are fully dust and sand proof.
- K12 has an exceptionally heavy electro magnetic structure and requires slightly more excitation than standard speakers. Most circuits can be adapted to take a K12. In addition, Rola provides F12, a speaker generally similar to K12 except that it has a standard electro magnetic assembly, and is therefore able to be used on sets designed for standard speakers.

K12 50/- F12 41/-

Full information concerning these two and other Rola speakers can be obtained from the distributors.

GEORGE BROWN & CO. PTY. LTD.
267 Clarence St., Sydney, N.S.W.

JOHN MARTIN PTY. LTD.
116 Clarence St., Sydney, N.S.W.

ROLA CO. (AUST.) PTY., LTD.,
116 Clarence St., Sydney, N.S.W. B5867. The Boulevarde, Richmond, E.1. Victoria, J5351.

Manufacturers of the World's Finest Sound Reproducers

The tuning condenser used is a single gang, full size modern type, having a maximum capacity of approximately .000385 mfds. However, a condenser having a larger capacity than this will work quite satisfactorily. Thus, if you happen to have one with a capacity of

The resistors as used in the receiver. Top to bottom they are: .5 ohms, 600 ohms, 2 megohms. The .25 megs looks just like the 2 meg resistor.

.0005 on hand, you can use it. You should avoid using a condenser with capacity lower than .000385, otherwise you may have difficulty in covering the entire broadcast band.

REACTION CONDENSER

Number required: One.
Type: Midget type.
Any of the well-known makes will do providing the condenser has a capacity of approximately 100 mmfds.

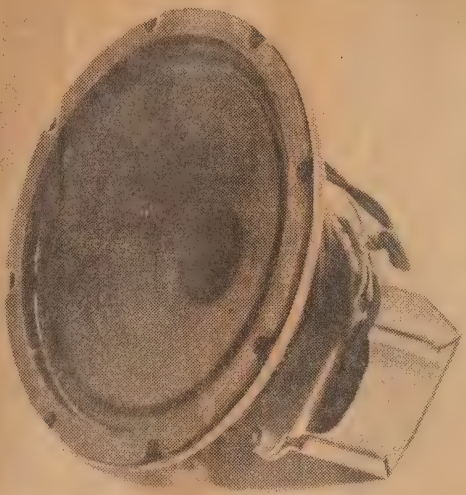
SPEAKER

Number required: One.
Type: 4in. permanent magnet.
The speaker used was one of the latest 4in. permanent magnet type, matched to the output valve 1Q5G. The speaker is quite easy to wire into the set as there are only two wires to connect. The volume this small speaker can produce is quite surprising, and it can be heard comfortably from any part of a normal sized room.

BATTERIES

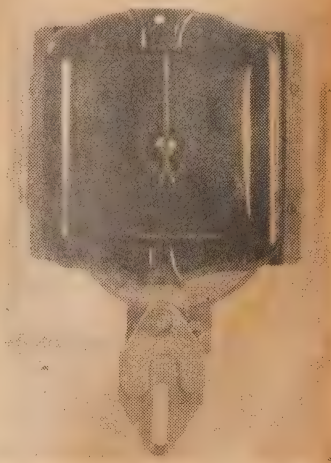
Number required: Three.
Type: One PR8 and two PR45.
The PR8 is a 1.4 volt battery, and is

A handful of solder lugs are required.



The baby permagnetic speaker used in the receiver. Any of the standard makes will be suitable. The speaker is bolted down to the chassis.

A group of batteries: 2 45-volt B batteries and a 1.4 volt A battery. These are the light duty types. If the set is in constant use, we suggest using heavy duty batteries in place of those shown.



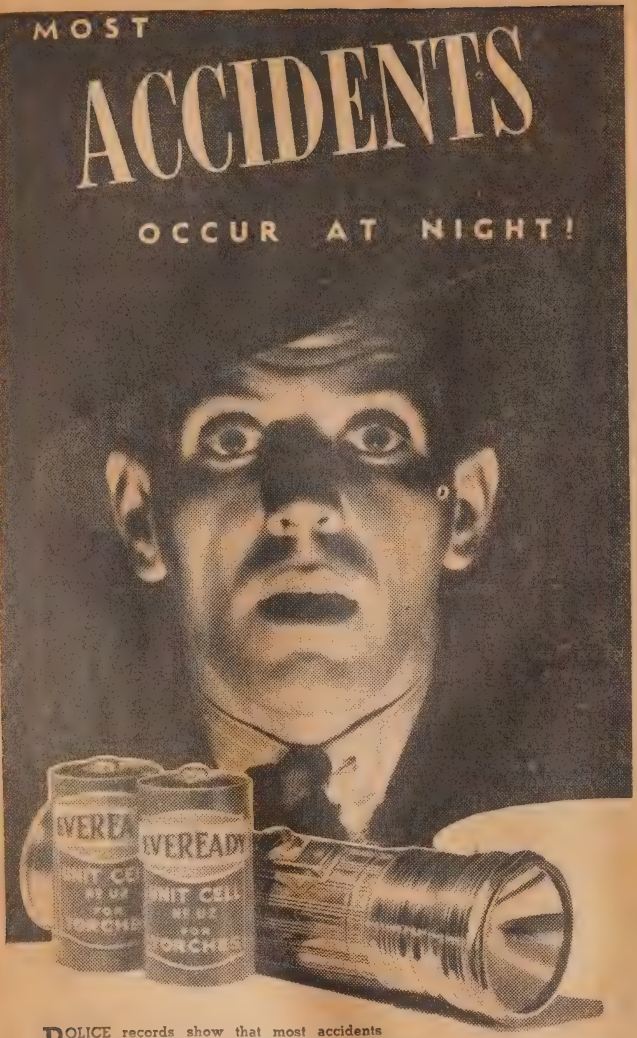
This is the dial we used. It is obtainable in a calibrated scale, or a plain 0-100 degree scale.

The two valves——1G4G and 1Q5G. Any of the standard makes will do, the results being exactly the same in all cases. The type numbers are the important thing to watch.

Brass or nickelled nuts and bolts are used to hold the parts on the chassis. One-half inch in length, they are $\frac{3}{16}$in. in gauge. Two dozen should be ample.

Three knobs and some hook-up wire are required. About two yards should be ample.

MOST
ACCIDENTS
OCCUR AT NIGHT!



POLICE records show that most accidents occur during the "wee sma' hours" . . . so play safe and carry a torch when you go out at night. Never in the way, but indispensable in an emergency, its friendly beam of light prevents stumbling and fumbling in the dark, saves time and temper. You can get a genuine Eveready Flashlight anywhere for a few shillings and "factory fresh" Eveready Flashlight Refills are obtainable everywhere.

Illustrated is one of the new Eveready Standard Line Flashlights, No. 3773. 2-cell Focussing Spotlight, 1¼-inch Reflector.

T42-1368

EVEREADY
TRADE-MARK
FLASHLIGHTS & REFILLS

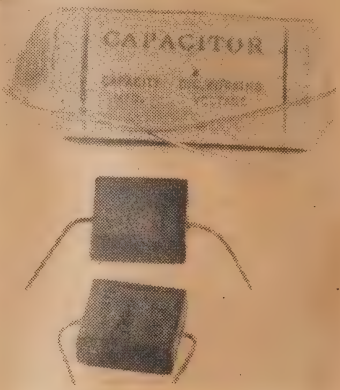
EVEREADY (AUSTRALIA) PTY. LTD., SYDNEY, N.S.W.

used as a filament supply. The PR45 are rated at 45 volts each, and supply the high tension voltage.

These batteries are only suitable for light duty. If the set is going to be used a great deal, it would be cheaper to use larger batteries. AX250 should be used for the A battery, while heavy duty or superdynes are the most suitable for the B batteries. These larger batteries are recommended because they are capable of many more hours of service, and actually in the long run are cheaper to use.

VALVE SOCKETS

Number required: Four.
Type: Two octal, two five-pin.
The two octal sockets are used for the valves, whilst one five-pin socket is used for the battery connections and the other as the coil socket.



The 25 mfds condenser is shown at the top. The two mica condensers are of .0001 and .00025 mfds capacity.

VALVES

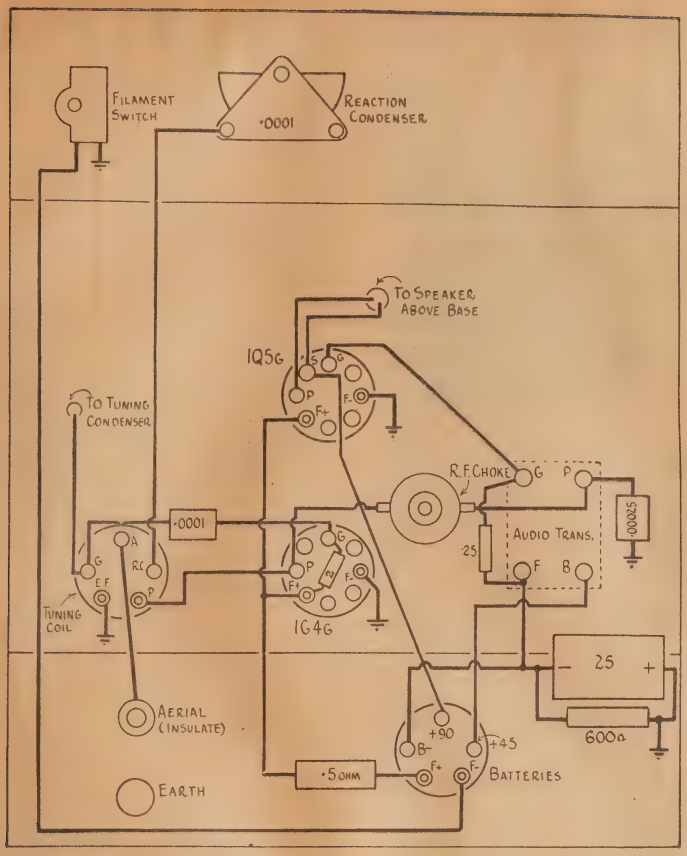
Number required: Two.
Type: One 1G4G and one 1Q5G.
Both these valves have the latest octal base. Often these bases seem strange to the beginner because of the large number of pins that have no connections. However, by following the wiring diagram there should be no difficulty in this respect.

RESISTORS

Number required: Four.
Type: One 2 meg., one .25 meg., one 600 ohm wirewound, and one .5 ohm.
The 2 meg. and .25 meg resistors can be either ½ watt or 1 watt types. The 600 ohm resistor is used as the bias resistor for the 1Q5G, and the .5 ohm is used to drop the A battery voltage to the correct limits.

CONDENSERS

Number required: Three.
Type: One 25 mfd. tubular dry electrolytic, one .0001 mica and .00025 mica condensers.
The 25 mfd. condenser is one of the familiar tubular type, usually having a



Here is the wiring diagram drawn exactly half-scale. You can take layout measurements from this.

waxy finish. Connections are made by means of wire pig-tails, one of which comes out each end. Sometimes the shape of these condensers varies with the make, but it doesn't affect the set. The mica condensers are made in moulded bakelite case with the capacity marked on the outside. The connections are usually made by means of wire pig-tails or metal connecting strips.

THE DIAL

Number required: One.
Type: Efco type AJ 11.
You will notice in this case we have specified a special make. The reason for this is that it might not be possible to obtain a similar one in another make.

The dial may be obtained with 0-100 degree calibration, or with stations marked. In the latter case, it is possible to adjust the coils so as to make quite a good approximate match for this receiver. However, the calibrations being made originally for larger receivers, may not always coincide. For this reason, many may prefer the single 0-100 degree scale.

COILS

Number required: Two.
Type: Duplex Single coils.
As previously mentioned, the coils we

The four valve sockets required. A five-pin battery plug can be used or the battery leads soldered direct to the socket pins.

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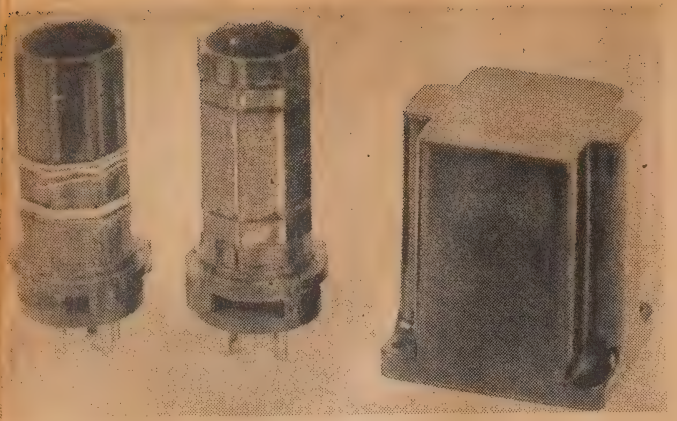


At the left are the two coils of the Duplex Single type. To the right is a typical audio transformer.

sed were the Duplex Single type. One oil covers the broadcast band, whilst he second one covers from 16-50 metres. his gives the set practically the same ning range as a larger dual-wave re-eiver.

AUDIO TRANSFORMER

Number required: One.
Type: Approx. 3:1 ratio.
The audio transformer we used was ne of the latest type having a ratio of 3:1. This ratio is not very important, so if you have one that is somewhere near this, it should be quite suitable. It is not necessary to buy a very expensive transformer, since many of the cheaper ones will suit your purpose quite well.

SWITCH

Number required: One.
Type: Small toggle or rotary switch.
The type of switch used is not very important. Any small one will do that you might have in the junk box. The main thing is that its action should be clear and positive.

TERMINALS

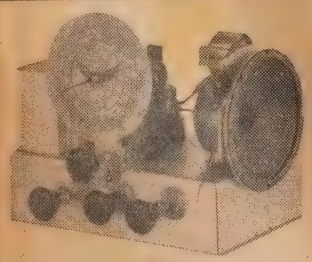
Number required: Two.
Type: One red, one black, terminal.
These are of the "push-back" type. The red one is used for the aerial connection, and the black one for earth.

RADIO FREQUENCY CHOKE

Number required: One.
Type: Single section or special S.W. type.
Although we have stipulated a single section radio frequency choke, we think that a multi-pie type will probably give better results. They are often better on the short-waves than the simple single section type. However, you can please yourself as to the type you use—both will give good results.

SUNDRIES

Since the balance of the components are mostly odds and ends, we will summarise them under one heading. About two yards of hook-up wire should be quite sufficient to wire up the set. Eighteen 2 x 4 brass nuts and bolts will be needed to mount all the parts. Also eight long bolts are needed. Four are to mount the condenser, as it usually has to be adjusted to the dial spindle. The other four are needed to mount the transformer. Three knobs are needed



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for the three controls, and also don't forget to include about a dozen solder lugs. A five-pin battery plug is used to connect the set to the batteries. And it is neater than having a lot of wires sprawled all over the place.

THE ASSEMBLY

By now you will probably have a good idea what each part looks like. This will make the assembly easier.

First of all, start off by mounting the sockets in their correct positions. Care should be taken to see that the octal sockets are put in with the key slot facing the back of the chassis. This will make the wiring easier to follow.

The tuning condenser should next be mounted. Before placing this in position solder about 6 inches of hook-up wire to the connecting lug at the bottom of the condenser. This connects to the coil socket and it is easier to solder it now than when the gang is in position.

Fit four ½-inch bolts to the mounting feet of the condenser. Now run a second nut up each bolt to act as a "stop" to hold the condenser about 3-16in. from the chassis. Push the bolts through the chassis holes, and then fit the dial over the condenser shaft.

The dial should fit flush with the front and top of the chassis, and by means of the small nuts on the condenser mounting bolts, the gang can be raised or lowered to suit the dial.

When the correct position is found the condenser should be securely bolted to the chassis.

The transformer can now be mounted in position. The speaker is best left until all the under-chassis wiring is complete.

We might add a word of warning about the speaker. Don't leave it hanging around on the bench. It has a very strong magnet, and this will attract any small metal particles to it. Should any of these get into the voice coil they are very hard to dislodge; it usually being necessary to return the speaker to the makers for cleaning.

Now with all the parts assembled on the chassis, we are ready to go ahead with the wiring.

THE WIRING

There is nothing in the wiring of the set that should prove difficult. The first thing to do is to connect the filaments of the valves.

The wiring is clearly shown in the diagram. Care should be taken not to forget the .5 ohm resistor in the A plus lead.

We found the easiest way to earth the A side of the filament was by attaching one end of a solder lug to the mounting bolt holding the socket in place and soldering the other end directly on to the filament socket lug.

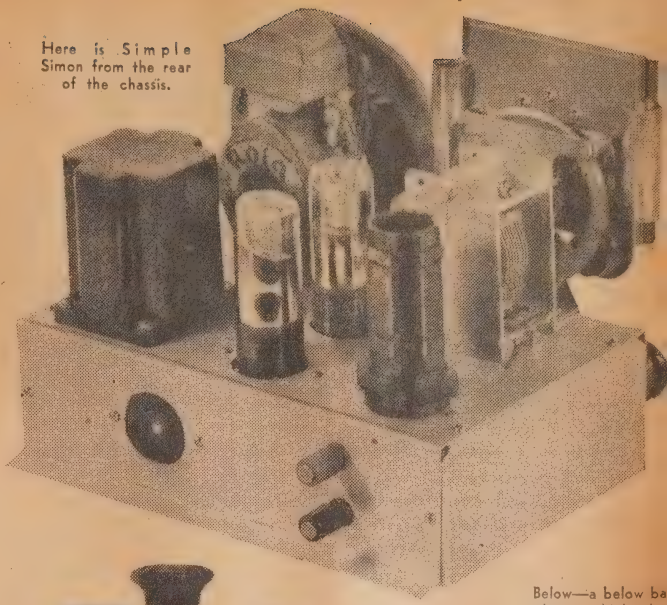
After the filaments have been wired up, it is a good plan to connect up the A battery to see if the valves light up.

If the connections are O.K., the filaments will be seen to be glowing when viewed in a darkened room.

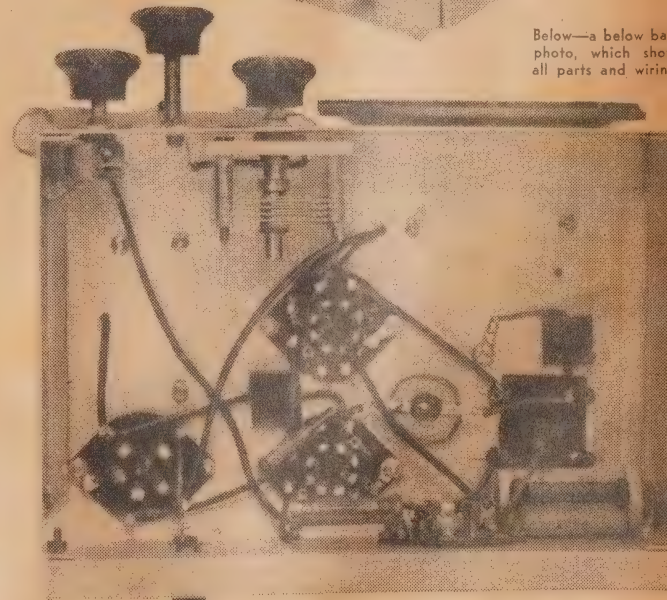
The coil socket is next wired, taking care to keep the grid condenser away from the chassis. It should be at least ¼in. away from the metal.

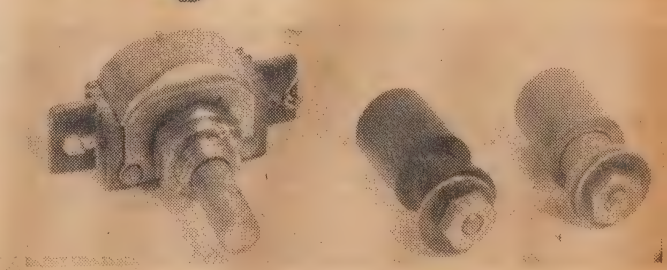
The rest of the wiring is quite straightforward if the diagram is carefully fol-

Here is Simple Simon from the rear of the chassis.

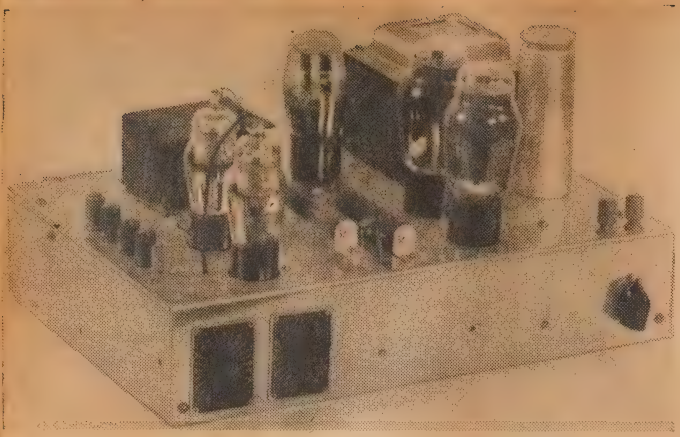


Below—a below ba photo, which sho all parts and wirin





Battery switch and the two terminal



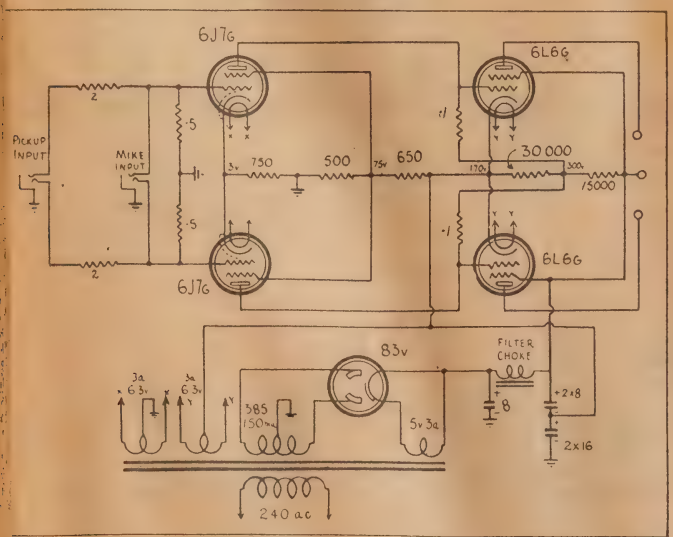
The push-pull direct-coupled amplifier with which experiments are being made.

A few issues ago, we printed the circuit of a push-pull direct coupled amplifier which appeared in an American magazine. This amplifier appears to have interested quite a few readers. Direct coupling is something which always seems to stay in the blood of many experimenters, particularly those who remember the circuit when first it was featured in "Wireless Weekly."

MORE ABOUT AMPLIFIERS

EXPERIMENTS IN DIRECT COUPLING

By JOHN MOYLE



The direct-coupled push-pull circuit.

MY experience with this type of circuit has been fairly extensive, even if years have dulled the full memory of all the strange little ways it seems to conceal in a perfectly straightforward exterior.

This experience taught that, although one amplifier built to this circuit would perform in a most impeccable manner over a number of years, another apparently exactly the same would not. There were dozens of readers who would not have anything else but a direct-coupled circuit in the place—others were equally as deadly in their condemnation of it.

Partly because of this, and partly because of the rather high voltages required for the circuit, it fell into disfavor. The resistance coupled method particularly proved so much more reliable that it now has become the standard method in our radio receivers, and in many of our amplifiers as well.

NOT SO NEW

This push-pull direct-coupled circuit seemed to stir memories, as we have said, and several readers have written to us to say that, having built it up, they have found it "the goods."

Actually, there is nothing very revolutionary about the circuit. It is based on a design which appeared in "Wireless Weekly" many years ago. Actually, it is composed of two such amplifiers placed back-to-back, and which can be used as separate channels, or together, as the case may be.

So interested was I in these reports that I spent some time experimenting with an amplifier built exactly to this "new" circuit.

RESULTS DISAPPOINTING

At first results appeared to be very hopeful. However, to date, I must admit that I have not been able to get what I consider really good results. We all have our ideas of what a 6L6G type of amplifier should do, and so far I haven't been able to realise them.

Exactly what is happening is rather hard to say, without a good deal more work than I have had time to give to it. It seems, however, that the balance of the circuit is by no means as it should be, because it works better in a single-ended circuit than it does as a push-pull hook-up!

However, there may be some who have done better than I have, and they might feel inclined to tell us about it. Possibly my amplifier is simply one of those which just don't seem to work out as they should.

Of course, the fundamental trouble with such hook-ups is that all the voltages depend on each other. If the driver valve for some reason does not behave exactly as it should, the amplifier generally is bound to play up. Such trouble will generally make itself felt as incorrect bias on the output valves.

As you can imagine, a little incorrect bias on 6L6G's isn't a healthy experience for them or for the amplifier.

Still, maybe I shall have a chance to delve a little more closely into the amplifier before it is pulled down for something else. If so, we will have something to say about it in these pages.

Quite a few people write in from time

to time, and ask me what type of amplifier I am using at the present time.

Actually, I hardly like to tell them because it is so simple. And at the same time, it does give results. It is built on a large base which boasts about half a dozen valve sockets not at present in use, so that if I want to be impressive I just fill them up with valves that don't do anything, and wait for the reaction.

Seriously, this amplifier is the successor to the original Stereoscopic No. 2, which was described in "Wireless Weekly" some little time ago.

This amplifier used a triode resistance coupled to another triode, transformer coupled to a pair of 2A3's with self bias.

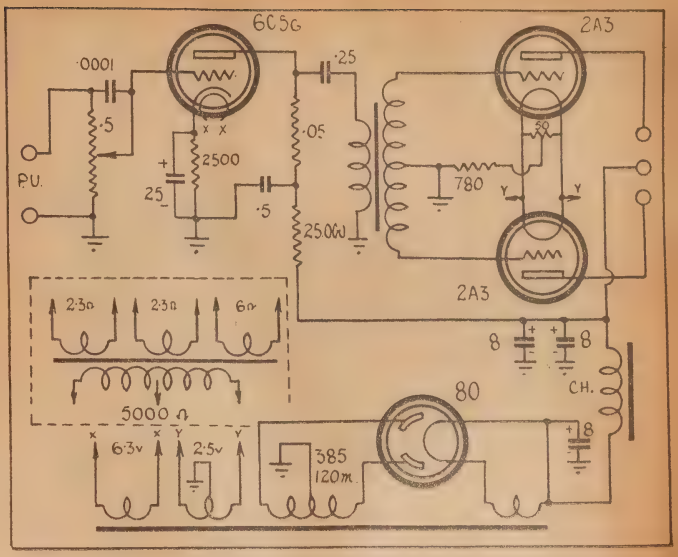
As it was used with a crystal pick-up, there was far too much gain in it. The volume control couldn't possibly be turned on more than a fraction before the output valves were overloaded.

So, one day I got the bright idea of cutting out the first of these valves. Now the pick-up works straight into the driver for the 2A3's, and gives more than enough output to load up the final stage.

The transformer coupling is still retained, with a shunt-fed circuit.

Of course, it is used with the stereoscopic set-up as originally described. This employs three speakers in all, and after more than a year's constant use, is the only equipment I have never felt like pulling to pieces after a month's use.

The circuit of the outfit is given here.



The amplifier circuit described here. A crystal pick-up should be used. Inset shows speaker connection. The 6 ohm winding feeds the high-note speaker.

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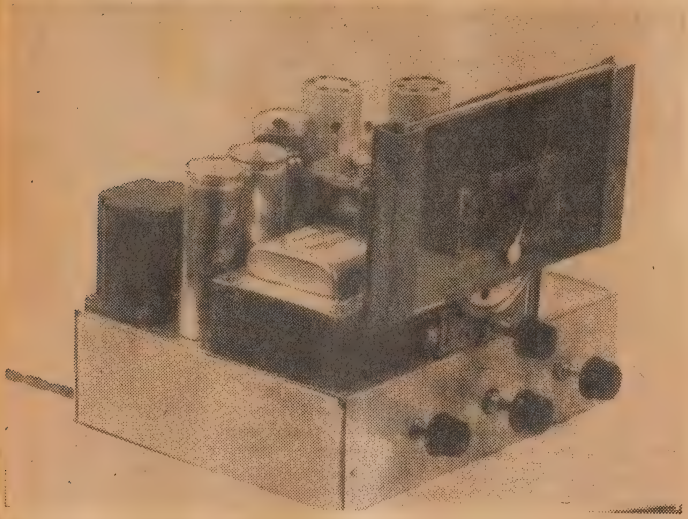
THE DE-LUXE FIVE-VALVE RADIOGRAM



This photograph shows the power supply of the receiver. Note the filter choke at the rear of the chassis.

Here is a set for the man who wants a quality receiver at reasonable cost. It has been specially designed for gramophone record reproduction should this be required. It uses a dual-wave tuner, and has an output of 6.5 watts. It is a little more complicated to build than the "Advance" sets, although by no means outside the capabilities of the average enthusiast.

THE De-Luxe Five Radiogram has been designed for a specific purpose. That purpose is to present a circuit which will represent a practical answer to the need for a five valve circuit of high quality.

During the last few months we have described a number of sets labelled the "Advance" series. As with all "Advance" sets, these were specially built with simplicity in mind. They gave good results with the very minimum of material.

Now the De-Luxe Five represents a different line of attack. In this set, we have not been concerned so much with what shall be left out, as with the set's performance when we have finished. Therefore, a few extra components are included to improve all-round results.

A RADIOGRAM

In the first place, this set is intended for use as a Radiogram as well as a straight radio set. Therefore we have taken a little more trouble over the audio amplifier than otherwise would be necessary.

This may seem a strange thing to say, but it is a fact that most people play their gramophone records at a much higher level than they do their radio.

Possibly this comes about because, as a rule, record reproduction is better than radio reproduction. For the record music has only the pick-up to contend with before it reaches the amplifier. But the radio signal must pass through the studio amplifiers, to the modulator, the final amplifier, and, lastly, the tuner of the receiver

As far as the transmitter is concerned, it may not have too bad a time. But at the radio receiver it generally does not fare so well. The higher registers, particularly, are apt to be a bit the worse for wear.

So, in this set, we have provided a rather high output audio end, with really excellent quality as well. It should provide as much volume and tone as the average man will ever need. The real record fan, of course, will have something even bigger and better up his sleeve.

THE TUNER

The tuning end of the set is not very much different from the Advance dual-wave set recently described. It uses the same little dual-wave bracket with which we have had such excellent results. There are, however, one or two alterations. These are consistent with our idea of stressing good design, even before cost and simplicity.

The converter is a 6K8G, probably the most popular converter at the present time. It is not without its faults, but it is a good valve on the short waves, and these days it isn't very hard to get really good sensitivity on the broadcast band with any of the converter valves now available.

The converter has its own bias resistor instead of sharing it with the I.F. amplifier.

In most cases this latter scheme is quite successful, but it is a fact that better results are possible by using separate resistors for those two valves. This is why you will find them in this set.

Apart from this, the converter circuit is quite conventional. The oscillator plate voltage is obtained from the same voltage divider tapping as is used for the screens. Note the 8 mfds. tubular electrolytic condenser from this tapping to the chassis.

This condenser is used as an aid to stability. Its reservoir action helps to keep the voltage from the tapping more constant.

Small changes which may occur in current drain, particularly when the set is in a sensitive state, will have a cumulative effect on stability. Thus, while often unnecessary, this condenser should be included in a standard design.

THE I.F. AMPLIFIER

The intermediate amplifier stage uses a 6U7G valve. This is the best valve for this position, from a sensitivity standpoint. It was our desire in this set to keep the R.F. gain as high as possible, which was our main reason for using this valve. Note the separate cathode resistor. Otherwise, nothing further worthy of comment.

THE SECOND DETECTOR

There is quite a bit we might mention about the second detector. You will notice that it is a 6B7S type—a duo-diode pentode valve.

We were faced with two possibilities in this set. Either we could use a duo-diode pentode as the I.F. amplifier, followed by a high-gain pentode as audio driver, or we could use the circuit as shown.

Now, the 6G8G (6B7S), as a pentode, has a much lower gain than the 6U7G, and still less than the 6J7G. Consequently, although it is often used for an I.F. amplifier, in this position, the 6U7G will give a definite increase in over-all amplification.

Thus, if we desire the highest I.F. gain, we will not use the 6G8G in this position.

Reverting now to the audio stage. With the 6G8G as I.F. amplifier, the natural choice here would be the 6J7G. This latter has a very high gain as an audio amplifier, so much so that when used with a high-gain output valve, it is really too much for comfort.

A HIGH-CLASS RECEIVER AT LOW COST

One of the worst troubles with this combination is that of hum. The gain is so high that the grid input lead is apt to be as touchy as a sore tooth. Great care must be taken to see that undesired hum is not picked up by this lead.

Another point in this connection crops up when we consider the matter of inverse feedback. The modern output pentode is generally a beam power valve. In the interests of musical quality, a beam power valve should never be used without inverse feedback. The reasons for this are obvious when we analyse the characteristics of beam power valves and their relation to their load at various frequencies.

Without being side-tracked into a discussion on this aspect, may we point out that, using the very simple and convenient method of inverse feedback shown in the circuit, it is impossible to use decoupling in the plate circuit of the audio pentode.

So we find a minimum hum voltage below which it is very hard to get, with the audio pentode circuit.

Now, remembering that the 6G8G has a lower gain than the 6J7G, naturally we will be better off if we use it for the audio amplifier, and keep the high gain in the I.F. amplifier. After all, the average five valve set can never be used "flat out," which means that the audio gain available is never realised. We would do better to keep it in the I.F. section.

This is the reason we used the circuit as shown. There is still ample audio gain for anything, and a lower hum level.

THE FILTER CHOKE

This brings us to another point in the set—the use of a filter choke in the power supply.

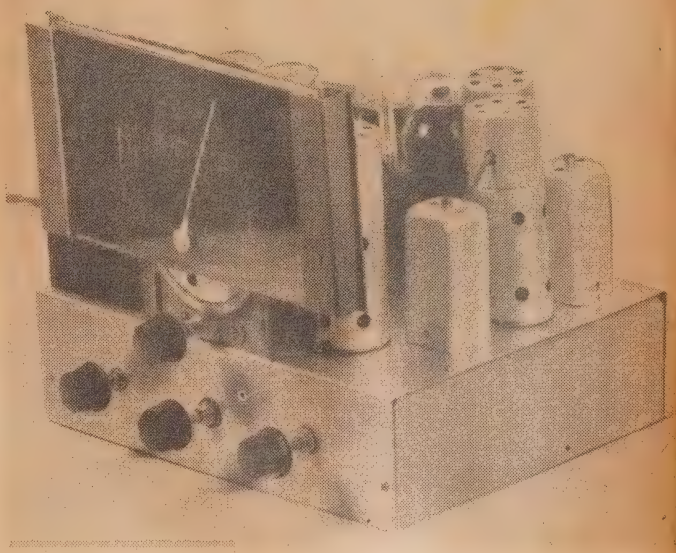
Even though we have lowered the audio gain somewhat, we still want to use the inverse feedback circuit, and even more do we want a set absolutely free from any filter hum.

Bearing in mind that the modern loud speaker has only a small inductance in the field, even in the larger models, we have felt for some time now that the hum level in the average set is far too high. Frankly, some commercial sets we have heard have been so bad we have wondered how anyone could put up with them.

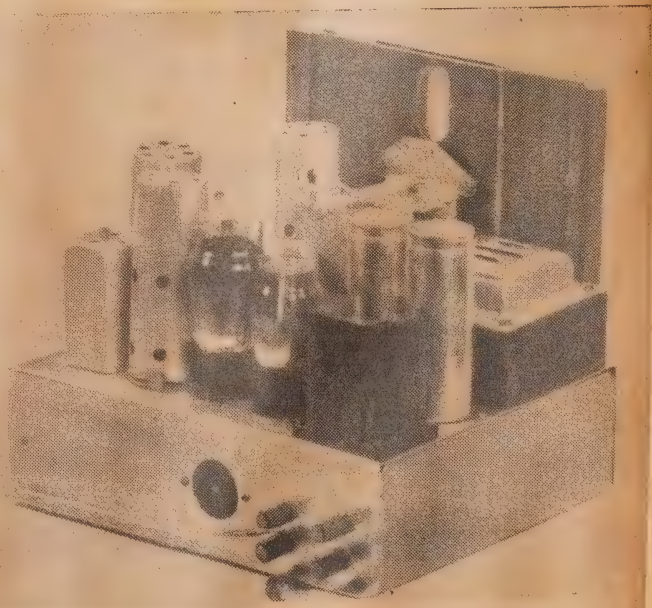
But the man who makes his own set has a right to be critical on this point. He should be able to make his set just the way he wants it.

There seems to be only one easy way out of the problem, and that is the use of a filter choke, and extra filter condenser.

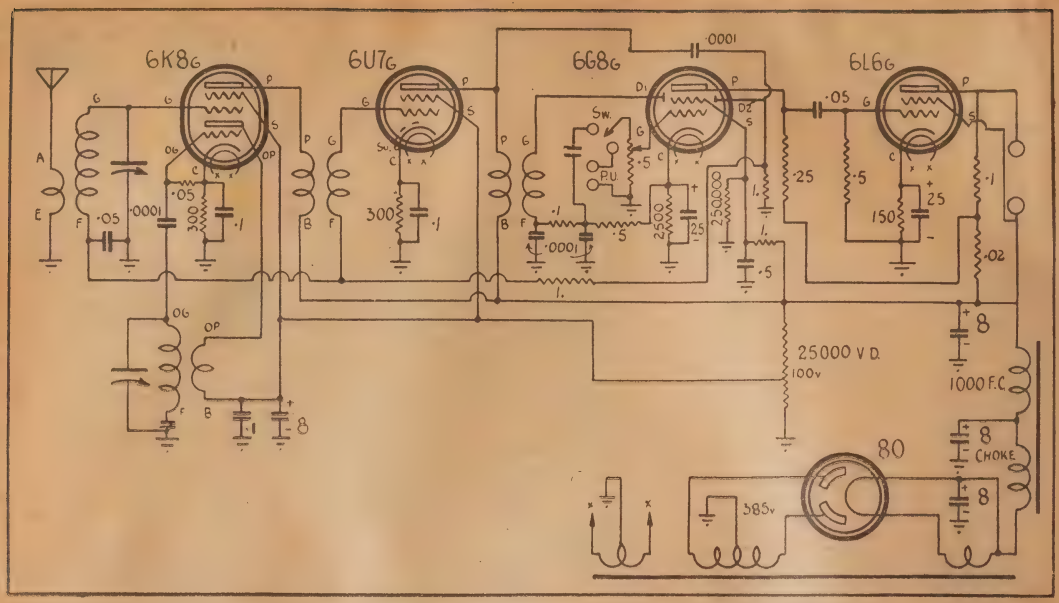
The cost of these two items is not very high, but the difference in hum level is most appreciable. One cannot tell when this set is operating, when there is no programme, except by jamming an ear down to the speaker. Everything that comes from this set comes from a completely silent background. And that



The tuning side of the set. The intermediate and I.F. amplifier are at the extreme right.



The set from the rear. Here we can see terminals for aerial, earth, and pick-up, als the speaker socket.



The circuit of the set includes all the refinements to be found in a high-class receiver.

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Morse keys only from 4/6 to 32/6.

High tone buzzers, 3/9 and 5/6.

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is a big thing when compared even with a set which has quite a low residual hum.

At the present time, we feel inclined to make the inclusion of such a choke a standard procedure. This set will work just as well without the choke, but it will not be as quiet. It will simply approximate the ordinary run of sets in this regard, because it will be using a filter no better or worse than they. Whereas, with the choke, it will be quite silent.

PARTS LIST

Chassis, 13 x 10 x 3.
1 Coil kit, including tuning unit, and 2 intermediates.
1 Tuning dial to suit.
1 2-gang tuning condenser.
1 Power transformer, 385 V. per side at 80 m.a., 6.3 volt and 5 volt windings.
1 80 m.a. filter choke.
3 8 mfds. 600 volt electrolytics.
1 8 mfds. tubular electrolytic.
2 25 mfds. electrolytics.
1 .5 mfds. tubular condenser.
4 .1 mfds. tubular condensers.
2 .05 mfds. tubular condensers.
4 .0001 mfds. mica condensers.
3 1 meg. resistors. 2 .5 meg. resistors
2 .25 meg. resistor. 2 .1 meg. resistors.
1 50,000 ohms resistor.
1 20,000 ohm. resistor.
1 25[illegible] ohm. resistor.
2 300 ohm. resistors.
1 [illegible]50 ohm. resistor.
1 .5 meg. potentiometer.
1 Pick-up switch.
1 25,000 ohms voltage divider.
Valve sockets—4 octal, 2 4-pin.
[illegible]lves—6K8G, 6U7G, 6G8G, 6L6G, 80.
3 valve cans.
Speaker—1000 ohms Field Coil, 2500 ohms load. Hookup wire, knobs, 4 terminals, nuts and bolts, &c.

Jumping back again to the second detector, you will see we have discarded the simple A.V.C. for the more satisfactory separate diode method. This relieves the diode load circuit from the extra damping of the A.V.C. connection, and allows even more control because the voltage is picked from the primary side of the I.F. transformer instead of the secondary side. Incidentally, either of the diodes may be used for the A.V.C. It is only with battery valves that we must be careful of which diode we use for A.V.C. or detection.

6L6G AUDIO SECTION

The audio amplifier in this set is the 6L6G. This valve has almost disappeared from the output stage of the ordinary receiver. Not because there is anything the matter with the 6L6G, but mainly because the 6V6G, also a beam output valve, will give good output with less current drain. And, to a set manufacturer, a few shillings of power transformer is quite a saving.

There are other advantages for the 6V6G. It has a lower percentage of harmonic distortion for maximum output, and a lower variation in current drain over its full audio range.

However, the use of inverse feed-back improves very much the characteristics of the 6L6G.

The distortion limit imposed by feed-back brings the two valves to pretty well an even footing here, or so close that the ear could not tell the difference.

Against all this, we must give the 6L6G a paper figure showing a good two watts extra output over the 6V6G, on the 250 volts rating. In practice, this means the difference between 4.2 watts and 6.5 watts. Certainly, the 6L6G draws more plate current, but to the

home builder this means only a few shillings extra for a 100 mills. transformer instead of an 80 mill. type.

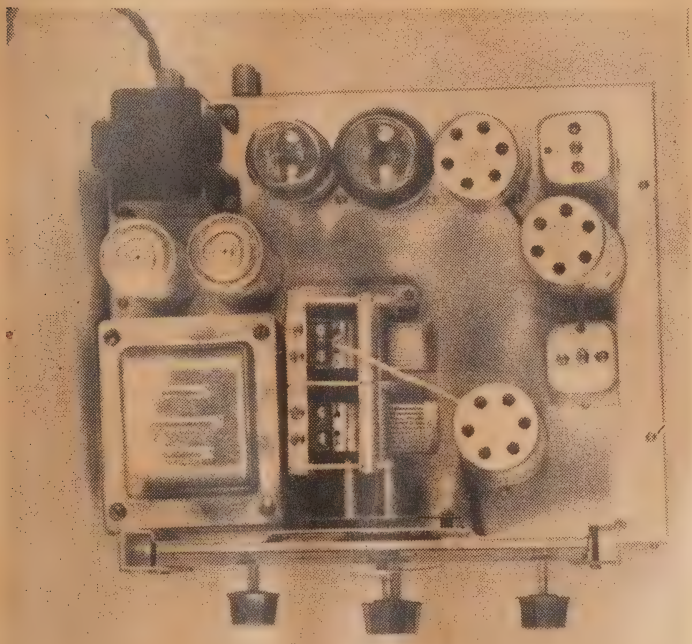
Quite critical is the load into which this valve should work. The correct value for 6.5 watts is 2500 ohms. It will work with a higher load, but results will most definitely suffer.

FEEDBACK CIRCUIT

The feedback circuit is a standard one. The plate of the audio amplifier runs to the junction of two resistors placed across the output. Their values are such that about 16 per cent. feedback is obtained.

In practice, this is not quite realised, as the plate resistor of the pentode is in parallel with the 20,000 ohms resistor. However, the net feedback would be more than 10 per cent., and may be this means a drop of about 100 volts in the field. There will be about 20 volts drop in the choke, and 16 in the output bias resistor. This means that the effective voltage on the 6L6G plate will be almost exactly 250 volts, its rated figure. At the same time, there is a 10 watt excitation for the speaker, which is quite enough for the output of the set.

This means, of course, that only the larger speakers should be used with this job. Not only is the audio output rather high for a small speaker, but the field wattage is also too high. There are several good 12-inch speakers in various makes which will do very nicely, and our advertisers will be able to give you further information in this regard. We have tried them all, and they are all good.



This plan view gives a good idea of the set's layout.

accepted as quite a good figure. It is a mistake to overdo this feedback business, as, we fear, is often the case commercially.

The 6L6G when used in this circuit is capable of extremely good quality. It is not as good, for instance, as a really good push-pull 2A3 amplifier, but, at the same time, it really is quite high. For a single-ended circuit, it is probably the best all-round circuit of all, bearing in mind the output we can obtain.

Used with a good 12-inch speaker, you will be pleasantly surprised with the results on both radio and records.

SPEAKER FIELD

The speaker field is 1000 ohms. As the total drain of the set is about 100 mills.,

The circuit for switching in the pick-up is very straightforward. This is because we have wired the volume control in the grid circuit of the pentode, and not used it for the diode load, as sometimes is done. While there are some advantages in this method, there are also disadvantages. Chief among them is the fact that rectified current will be flowing through the control when used as the diode load, and the control might become noisy after a while.

All the leads in this grid circuit should be made with braided hook-up wire, with the shielding braid well earthed. This includes the leads to the gramophone switch.

Any good pick-up can be used, our preference being for the crystal type.

REGISTERED TRADE MARK

RADIOKES

PRECISION PRODUCTS

Specify RADIOKES Coil Kits for the de Luxe Five, Coil Kit No. RKI27, consisting of the famous DAU-I Unit and 2 Intermediates. Type No. RK127. List Price. £2/2/6. Post paid.

Type DAU-I

THE FAMOUS DAU-I DUAL WAVE UNIT

Available from 16 to 50 and 13 to 36 metres S.W.

Type DAU-I £1/7/6

Simplicity is the keynote of the "Simple Simon" Radiokes Kits. Radiokes Coil Kit, consisting of S.W. and B.C. Coils. Type RKI28. List Price, 13/-, Post paid.

Broadcast Coil, Type ACB.

Radiokes Foundation Kit, consisting of RK128 S.W. and B.C. Coils, 13 0
Tuning Condenser 9 0
Midget Condenser 5 11
Audio Transformer £1 0 0
R.F. Choke 1 0
450 ohm Resistor 10

Simple Simon Foundation Kit, RK129, £2 9 9

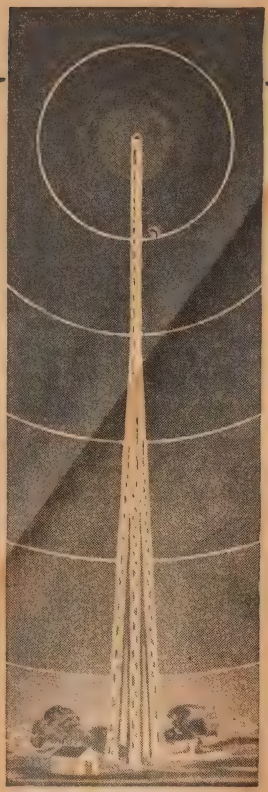
We are Factory Representatives for all

RADIOKES and R.C.S. Radio Products

Write us for details of Radiokes or R.C.S. Line. New illustrated Radiokes Price List is available! Write for a copy, free and post free!

RADIO SUPPLIERS PTY. LTD.

Wingello House, Angel Place, Sydney. 'Phone, B4586, B4557.



SPECIFIED for

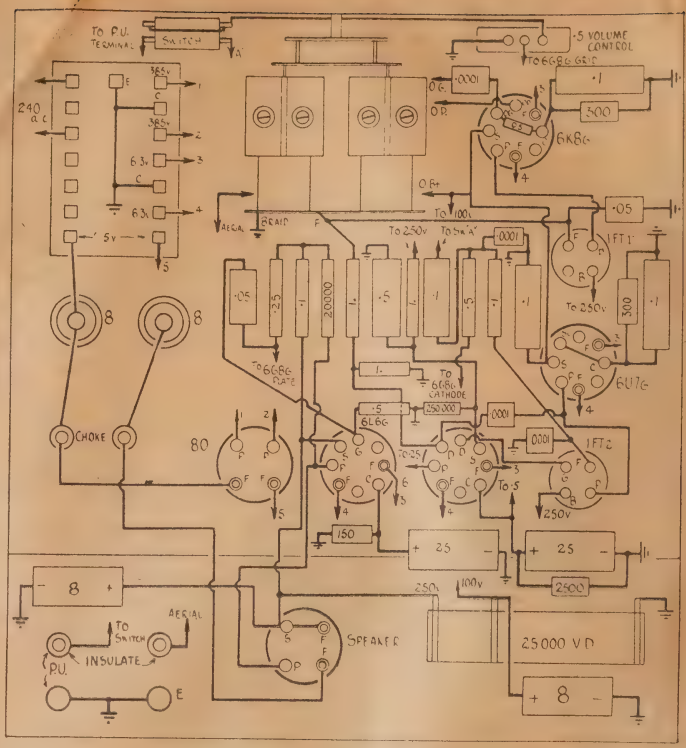
3LO and 2FC

In the construction of these, and other, powerful national transmitters complete reliability was of profound importance. Hence Ducon condensers were specified.

The Ducon-Chanex name will guarantee you the same efficient, trouble-free service.

Ducon willingly co-operates with engineers to ensure correct types and ratings.

DUCON-CHANEX
CONDENSERS & RESISTORS



The under chassis wiring for the De-Luxe Radiogram.

CONSTRUCTION

The construction of this receiver is no harder than that of other less complicated sets. The only difference is that this circuit uses a few more small parts than a set, for instance, such as the Advance.

Thus it is simply a matter of a little more care in fitting these into the set, and a few more acrobatics in the handling of the soldering iron.

As you will see from the wiring diagram, most of these components are mounted on an insulated terminal strip in the centre of the chassis. Some of them can best be mounted direct but this is not possible in all cases.

The terminal strip is held in place by a couple of long bolts on which brass nuts are threaded and screwed down.

Unfortunately, it has been a little difficult to make a clear wiring diagram of the set, because one can place more wires in practice, in a given space, that one can draw lines.

However, wherever a complete line has not been possible, we have indicated the connection by a couple of arrows.

These are numbered so that you cannot make a mistake with them.

The drawing is made to scale in order that the diagram can be used as a guide when laying out the chassis.

Note that the coil unit is mounted to the chassis with a single-hole-mounting.

The leads to the tuning gang run through the chassis to the gang itself. The aerial section uses a white lead, and the oscillator section, a yellow lead. The coil assembly will come with a color code detailed on an accompanying sheet, to which you should refer when wiring up.

In order to prevent hum pick-up, the leads to the switch and volume control should be shielded, as we have already pointed out. The braid should be well earthed.

LINING-UP

The lining of the set is very simple. Leave everything as it is for a start, and get the set into operation. You should be able to pick up a local station right away. If the marking at the high-frequency end of the dial does not coincide with a station such as 2SM, for instance, adjust the oscillator broadcast trimmer until it does.

Then adjust the aerial trimmer until you get the best volume.

Turning to the other end of the dial, tune in, say, 2FC, and try the effect

of adjusting the padding condenser. It should be left at the setting which gives the best volume. This should approximately check up with the markings on the tuning dial.

On the short wave section there is no oscillator adjustment, and the stations should be near enough to the markings on the dial. The aerial trimmer, however, should be checked over for loudest results by tightening or slackening, as the case may be.

When you are sure the set is otherwise lined up properly, you can check over the settings of the intermediate transformers to make sure they are O.K. The only trimmers which should need any adjustment are those across the coils of the second I.F. transformer. Be very careful, however, as only the slightest touch will be needed to put them out of line.

AERIAL

An aerial about 30ft. long should be used with the set. The maximum length would be about 50 or 60ft. There should be no need to use a larger aerial. In fact, too long an aerial is a definite disadvantage, in that it tends to load up the first tuning circuit too heavily, and spoil selectivity.

Naturally an outside aerial is to be preferred, as it gives a better pick-up than a wire inside the house.

A-SAP'S FABLES

A DEALER, whose service man was ill, decided to service a set himself. He was not very confident of success, however, so he put a bottle of whisky by his side to help him on his way.

He took the back off the set and after some time found something wrong with a condenser, and before attempting to replace it, he drew the cork from the bottle and took a swig. Then he put on the soldering-iron to get hot, once more took the cork from the bottle and had another short drink. Then he took up the soldering-iron, felt it, found it was not hot enough, took the cork from the bottle and took another short swig.

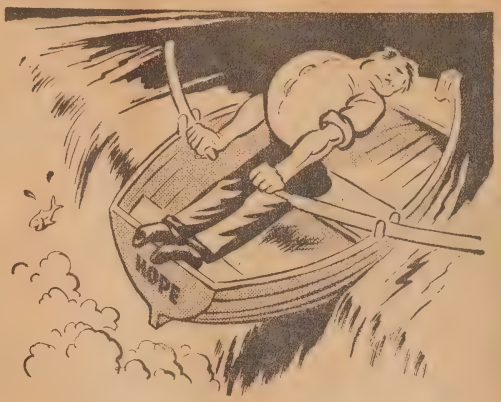
Then he picked up the bottle, drew the soldering-iron, put down the cork, and took a drink.

The next time he took the set from the soldiering-iron, drank the cork, and heated the bottle. Then he soldered the cork to the condenser, swallowed the soldering-iron, heated the set and sat on the bottle.

Then he swallowed the set, took out the soldering-iron, drank the cork, and heated the condenser. Then he heated the set, swallowed the bottle and soldered the cork.

The set then burst into flames and the dealer shouted "Hurray," fell asleep and died in the fire.

Moral.—Do see that you enter things with the right spirit.



ARE YOU WORKING HARD BUT SLIPPING BACK?

There's more in this radio and electrical business than merely fighting to keep above the breadline.

There's MONEY in it, too . . . but you won't see it if you're being swept downstream by High Prices and Slow Service.

Martin de Launay's will help you to surge ahead. You drop the oars and sit at the helm as soon as you send an order to us. You see, right away you get speedy service, keen prices and high quality.

That sounds like—and is—boasting. We're proud of the organisation we have created to handle orders, big or small, from anywhere in Australia.

Like to try us out?

SUGGESTION: Pin this advertisement to your letterhead and send to us. We will send you a handy order pad, free and post free.

We cover the Continent

Martin de Launay PTY. LTD.

Cnr. Druitt & Clarence Sts., Sydney, Newcastle, and Wollongong.

TRADE NEWS AND NEW RELEASES

RADIOKES MARKET COMPLETE SET

☆

Here is the new Radiokes set ready built and housed in an attractive wooden cabinet. The set is also available as a kit of parts for home assembly.

☆

AVAILABLE IN SEVERAL FORMS

THE latest Radiokes production is a mantel receiver designed to cater for everyone. It can be obtained as a complete receiver in a cabinet, as a kit of parts ready for assembly in the normal manner, or as a wired-up chassis ready to house in whatever type of cabinet you prefer.

By this means, Radiokes hope to popularise a line which is completely universal in its application.

The chassis is a 4/5 valve type, covering broadcast and short-waves.

It makes use of the Radiokes DAU-1 coil assembly in the tuning unit—one which has proved its results and dependability.

Tested in the showrooms of a city firm, this receiver was able to bring in overseas stations in daylight—an excellent performance. It speaks well for the possibilities of the set used under ideal conditions.

As will be seen, the cabinet is most attractive. A feature of the set is the tuning dial. Although quite small, it has all the important broadcast stations marked on the scale—all easily identified.

The receiver is marketed by Radio Supplies Pty., Ltd., of Wingello House, Angel-place, Sydney. All inquiries from dealers should be directed to this address. Our readers may make inquiries about this receiver at any of our radio stores.

Incidentally, the new Radiokes catalogue is soon to be issued. Write for it direct, or we will forward your request from this office, if you prefer it that way.

CROWN SERVICE

On the inside front cover of this issue, a complete list of Crown Radio Products suitable for use with "Radio and Hobbies" circuits has been advertised.

This has been done to provide both authorised distributors of Crown Radio Products and their customers with a chart which will enable them, with a minimum of inconvenience, to order and supply the appropriate components, and specify the correct type numbers, in order to avoid mistakes when putting the kits together.

This is typical of the service rendered by the management of Crown Radio Products Pty., Ltd. We suggest that reference be made to Crown Radio Products Dials when ordering from authorised distributors, as all types are accurately calibrated and "tracking" is guaranteed.

JOKES, TRICKS and NOVELTIES

MANY simple and inexpensive lines are on sale at Will Andrade's store at 173 Pitt-street, Sydney. Lines that you have read about, thought about, yet never knew where to obtain them—these and many others are all held in stock.

STEEL BALL TRICK

1. The ingenious little steel ball trick. Handing the trick to your friend or member of your audience, you ask him to try and get the balls into the holes drilled in the wood. When he has given it up you show him the solution. It will make him "tear his hair" when he sees how simple it really is.

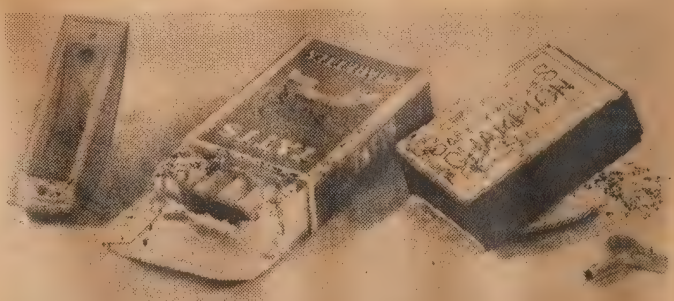
TRICK CIGARETTES

2. The harmless little packet of cigarettes. Looks as though it wouldn't hurt anything. But you can't judge a book by its cover, as, when offered to an unsuspecting friend, water shoots out from one of the cigarettes. A great joke, this one surprises them all owing to the realistic dummy cigarettes.

LIVELY MATCHES

3. When a friend asks you for a match you simply give him the trick box of matches. When you take your hands off the box it starts hopping back to you in a most unexpected manner.

These are just three of many lines that are in stock at Andrade's. All are priced very reasonably, so that the average person can afford them. By writing to or calling at Will Andrade, Ltd., of 173 Pitt-street, Sydney, you may secure an illustrated pamphlet which will show you the great range available.



Three party tricks from Will Andrade.

NEWLY LANDED ASTATIC DYNAMIC MICROPHONE

"DN-50 HAS "UNITARY MOVING COIL"

E.T.C. Industries Ltd., Factory Representatives for Astatic Microphone Laboratory products, announce the landing of sample stocks of Astatic Model "DN-50" Dynamic Microphone. This is the most recent addition to the well-known Astatic range and rounds out the line of quality microphones with a dynamic type incorporating several outstanding features.

A FUNDAMENTAL requirement in dynamic design is that the moving coil be very closely centred in the air gap with small clearances to obtain high sensitivity—a difficult problem because of the closed-in coil necessary in a dynamic microphone.

Astatic engineers have overcome this difficulty by evolving the Unitary Moving Coil System. Model DN-50 has its coil-diaphragm accurately located on a rigid front ring, the coil terminals being mounted also on the ring.

Precisely located dowel pins on the magnetic structure, during final assembly, guide the Unitary Moving Coil System to exact concentricity in the air gap. Not only are design constants more uniformly maintained in production, but proper initial spacing means longer efficient life, free of difficulty caused by rubbing parts.

The design of the magnetic structure has been worked out to obtain the maximum practical flux density combined with retention of the original high density over a long life.

A high grade Alnico circular slug magnet is the heart of the design, and

is used with soft iron pole piece. The remainder of the magnetic circuit is best quality low carbon steel of adequate cross section to prevent loss of air gap density through saturation.

A portion of the acoustic circuit is integral with the magnetic structure assembly and completely protects the moving coil from dirt and magnetic particles.

The output impedance of the DN-50 is 50 ohms, and the unit has a substantially flat response over the range from 50 to 7000 c.p.s. Output level is -55 db. The response characteristic may be somewhat altered by the use of the baffle attachment and tilting head.

Without the baffle attachment, the pick-up pattern may be made semi-directional in the horizontal position and non-directional in the vertical position, as desired. The plug and connector make it easy and convenient to interchange the microphone between different stands and cable lengths, while the Astatic Spring Cable Protector prevents cable breakage at the connector mounting.

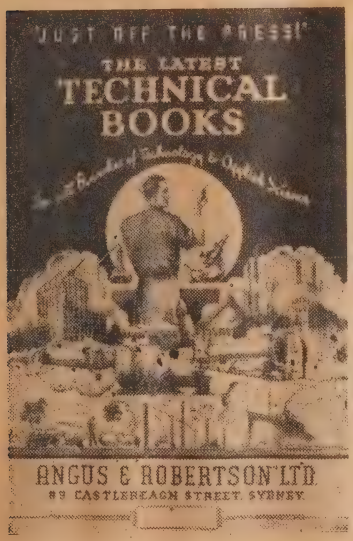
The DN-50 is distinctively new and handsomely designed, and is attractively finished in two-tone opalescent-grey and chrome. Further details will be gladly supplied by E.T.C. Industries, Ltd., 470 Elizabeth-street, Sydney.

FOXRADIO 1940 PLANS

ASSOCIATED with set building for many years, the well-known firm of FoxRadio, of 57 York-street, have started the year with a special service for builders of "Radio and Hobbies" kits.

FoxRadio have always insisted on high-quality parts as a plank in their policy. It is largely due to this policy that the firm has always commanded such a strong following. Where efficient service is guaranteed, business will follow. When ordering a kitset, speed and accuracy are essential.

Everything is securely packed in solid cartons in the execution of mail orders. No part is too large or too small to receive attention. And years of experience guarantee that you will get just what you have ordered.



FREE CATALOGUE

MORE THAN 200 titles are listed in this new catalogue just released by Angus and Robertson's Technical Book Department.

Amongst the many subjects covered are Radio, Photography, Carpentry, Chemistry, Motor and Diesel Engineering, Aviation, Refrigeration, &c.

It will be of interest and value to everyone who is technically minded. In addition, every book listed is a recent edition, and the information is right up-to-date.

POSTAGE ONLY

It costs only twopence to write for your copy. There is no charge for the catalogue, which will be sent post free on application to any address.

With the catalogue you will receive full details of Angus and Robertson's special "On Approval" system, which is a great help to country buyers who are unable to call and examine the books personally.

SUDDEN DEATH OF MR. H. I. HOBDEN

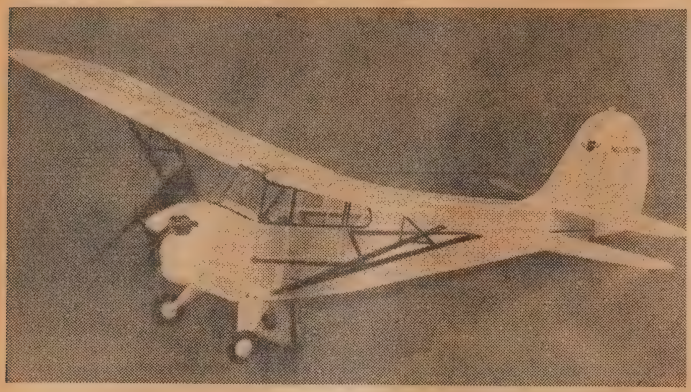
WE regret very much to announce the death of Mr. H. I. Hobden, executive of E.T.C. Industries Ltd.

Mr. Hobden, who had been in poor health for some weeks, died suddenly on February 20.

Mr. Hobden had been associated with his company for many years. His personality and his outstanding business ability made him respected throughout the whole radio industry. In the early days of "Wireless Weekly" he proved himself a good friend and a staunch supporter.

We extend to his family, and to his company, our deepest sympathy in their loss.

MODEL PLANES GOOD SELLERS



This graceful plane, ready to fly, is obtainable from Walther and Stevenson.

READY BUILT & READY TO FLY!

A REPORT from Walther and Stevenson Pty., Ltd., of George-street, Sydney, states that the model planes kits mentioned in last month's issue of "Radio and Hobbies" are selling exceptionally well. Just landed from America, the graceful lines of these models will win their way into the heart of any youngster.

By youngster we mean junior, dad, and grandad, as, when all is said and done, the grown-ups are still youngsters at heart.

Just one reason for the popularity of these kits is the simplicity of construction. Even the very largest model can be put together just as easily as the very smallest. The plans and instructions are thorough and enable the constructor to make an A1 job.

Everything is included in the kit, and after the initial cost there is no additional outlay. Prices range from 1s 9d to 45s.

Walther and Stevenson's are situated at 391 George-street.

COOKE BROS. KITS

NEWS from Cooke Bros. Pty., Ltd., of 483 Kent-street, Sydney, indicates that this firm is having great success with kitsets of the various Radio and Hobbies circuits. "Speed" is the watchword of Cooke Bros.' despatch department, and no time is lost after any kit has been ordered.

A complete range of replacement parts is held in stock by this firm, and all brands specified by "Radio and Hobbies" are sold.

Special service is given to all "Radio and Hobbies" readers.

PORTABLE KIT SALES

MARTIN DE LAUNAY are delighted with the sale of "Radio and Hobbies" receivers, described during the last twelve months.

Particular favorites, they report, are the portable sets. Both the three and four valve models have been best sellers from the first week of their release.

Although the four-valve set was described in June of last year, it is still being sold in kit form in large numbers.

Its best recommendation comes from those who have built it. Many of the present sales, says Mr. Logan, of de Launay's, are to people who have heard one in action.

Martin de Launay's can supply kits of parts for all R. and H. receivers. More than this, they specialise in service for mail order customers. They should know all about this phase of the business, as over many years they have built up a big name and a bigger reputation for prompt service.

ACCURATE DOWEL-PLUG TOOL

EVERY woodworker has had occasion to use wooden dowels in the course of his cabinetmaking. He will know also how difficult it is to keep the dowel holes accurately in line so that his job will line up when completed.

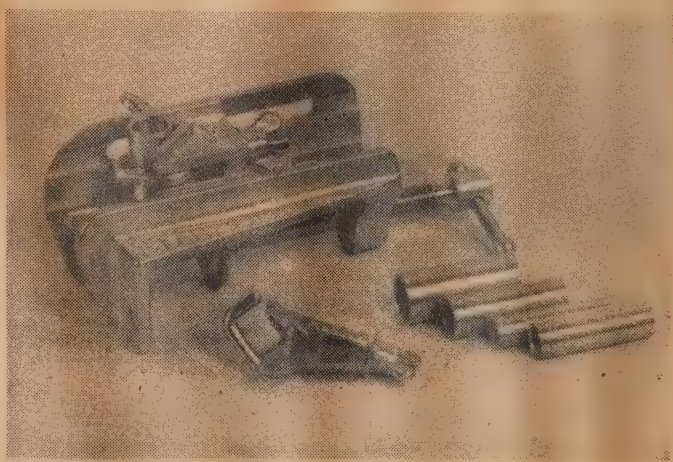
Nock and Kirby's have a splendid device which will solve all his problems. It is the Stanley Dowelling Jig, a simple job which makes short work of dowelling problems.

It enables the user to bore dowel holes in the edge or on the surface of the work with ease and accuracy.

Any thickness of material up to three inches can be worked with this jig. In addition, it can be used as a very excellent bit guide for mortising or any other job where such a guide is required.

The name Stanley is enough to inspire confidence in any tool. Perhaps that is why this line has been popular. The disorganisation of shipping has made it a very difficult one to supply. However, a new shipment has just arrived, and Nock and Kirby are thus able to supply any demand while these stocks last.

Any tool for any job may be obtained from either of their two stores—417 and 188 George-street, Sydney.



The Stanley Dowelling Jig.

Radio Equipment Booklet

From Radio Equipment Pty., Ltd., we have received a very nicely-produced booklet, featuring all the best-selling sets from "Radio and Hobbies" since the paper came into existence.

RADIO Equipment got the idea for this booklet from the ready sale they experienced for kits of parts to build these receivers.

Each leaflet contains a large picture of the set, ready built, exactly as it appeared in Radio and Hobbies.

In addition, there is a complete list of parts, down to the knobs and hook-up wire, and ready-drilled chassis.

The issue in which the set was described is shown on each sheet, so that the builder can refer to it if he so desires.

RECEIVERS INCLUDED

The receivers detailed include a four-valve portable receiver made up by the firm's staff.

Then follows the Pentagrid 3 Portable set, Australia's only three-valve portable, and one of our best-known receivers. The Pentagrid Three, the same set built for ordinary home use, comes next.

Then there is the new Duplex Single, the only one-valve loud-speaker receiver we have ever recommended. It covers short-waves as well. The sensational 4/39 mantel set is here also—one of last year's biggest sellers. Little Jim's Mate, an all-battery set for your bedside, comes next. Finally, there is the Advance 1939, and its successor, the Super-Advance, the latter being a six-valve set, and the R. and H. Converter, which transforms any good broadcast set into a powerful dual-waver.

Other receivers are quoted more briefly elsewhere. The folder has a sturdy and attractive cover, and should be invaluable to anyone interested in set-building.

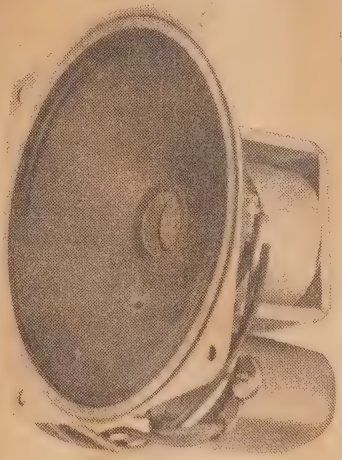
Drop a line to Radio Equipment Pty. Ltd., if you would like one for yourself.

Amplion Announce New Lines

Seven And Five Inch Speakers

During the last few months, Amplion have produced some excellent new speakers covering practically their full range. Both electro-dynamic and permagnetic types have been included.

OUTSTANDING in the 1940 Amplion releases is the "big" 7in. electrically welded speaker, which the company claims supersedes 6½in. and 8in. standard types. This



The new Amplion 5-inch speaker.

speaker has a superior frequency response and will handle undistorted outputs of 8 watts with a maximum loading of 12 watts under adequate cone loading conditions.

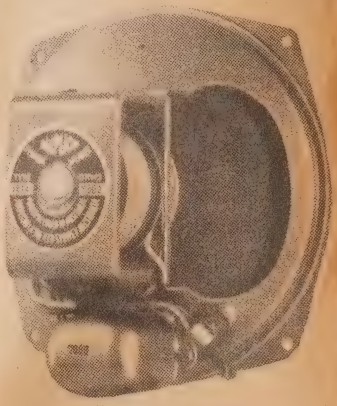
The speaker follows the new design of the Amplion 5in. in that the mounting holes are removed from the cone edge and placed in projecting corner pieces, allowing a cone to be used which very closely approximates that of the 8in. types. A large and efficient field coil excites the electro-magnetic unit. Permag models use a 14 ounce Darwin Alnico permanent magnet, and this model will handle 6 to 10 watts of power.

Completely dustproofed, the 7in. series is the most modern obtainable, with insulated core, sealed transformers in which the core stack is connected internally to the high tension side of the primary winding.

36-HOUR IMPREGNATION

The transformer windings are subjected to a double impregnation process before sealing in the case, which takes 36 hours to complete. The core laminations for all Amplion transformers are stamped from the highest grade of transformer iron, Armco Trancore III., which allows of the use of a much smaller transformer to give the best results with reduced leakage; all push-pull transformers are interleaved for the greatest efficiency.

Stocks of both electro and permag



The 7-inch Amplion.

types are now freely available from wholesalers and dealers throughout Australia.

The new 5in Amplion with mounting holes outside the cone proper has an effective cone area 30 per cent. greater than any other 5in.; the active cone diameter is ¼in. greater. This 5in. will handle 3 to 5 watts. The Permag, is fitted with a Darwin Alnico magnet of 8ozs. weight, and the speaker's rating is 2 to 4 watts. All types, electro and permag are available from stock from wholesalers throughout Australia.

These speakers are described in a data sheet, No. 88c, obtainable from the Amplion Company, Sydney. They may also be seen at the company's Royal Sydney Show exhibit at stands 43, 44, and 45 at the Horden pavilion.

NEON TATTELITE TESTER

FROM Radio House we have received an interesting circuit tester for use on either A.C. or D.C. current.

The indicator is a small neon lamp mounted in a glass protective tube. A pair of black and red prods are fitted to indicate polarity on D.C. circuits.

The uses of the "Tattelite" are many and varied. Some of these are testing for continuity of power lines, fuses, grounded lines, &c.

Connecting cords for household appliances may also be tested for breaks, &c.

This device appears to be a particularly neat and effective use of the neon. The current drain is small—another great advantage.

Here is the novel Neon tattlelite tester.

S. W. TUNING CHART

13 METRES

GSJ. 13.93m. 8.40 p.m. onwards.
GSH. 13.97m. 8.40 p.m. onwards.

16 METRES

GSV. 16.85m. 10.0 p.m. till 11.45 p.m.
GSG. 16.86m. 8.40 p.m. till 11.45 p.m.
2RO8. 16.84m. Rome. 8.0 p.m. till 10.25 p.m.
DJH. 16.82m. Berlin. 8.0 p.m. onwards.
TPB3. 16.88m. Paris. 8.0 p.m. onwards.

19 METRES

DJR. 19.56m. Berlin. Good from 9.0 p.m.
GSF. 19.82m. Daventry. 6.30 p.m. till 8.0 p.m.
YDC. 19.8m. Bandoeng. Good from 9.0 p.m.
PCJ2. 19.71m. Huizen. 10.40 p.m. onwards

25 METRES

GSD. 25.53m. Daventry. 4.0 p.m. till 8.0 p.m., 8.40 till 11.45 p.m.
Radio Saigon. 25.47m. Saigon. Good from 8.45 p.m.
WCBX. 25.36m. New York. 7.0 a.m. onwards.
WPIT. 25.27m. Pittsburg. Good at 7.0 a.m.
VLW3. 25.58m. Perth. Good in afternoon.
VLR3. 25.32m. Lyndhurst. Good in daytime.
TPC8. 25.33m. Paris. Excellent at 7.0 a.m.

31 METRES

GSB. 31.55m. Daventry. 4.0 p.m. till 6.15 p.m. Midnight on.
GSC. 31.32m. Daventry. 6.50 a.m. till 9.0 a.m.
KZRH. 31.15m. Manila. Excellent from 8.0 p.m.
WGEO. 31.48m. Schenectady. Very good at 7.0 a.m.
VLQ. 31.21m. Sydney. Very good at night.
2RO9. 31.03m. Rome. Very good at 7.0 a.m.

41 METRES

No stations heard at entertainment level.

49 METRES

KZEG. 48.86m. Manila. Good at night.
GSA. 49.56m. Daventry. Good at 3.0 a.m. onwards.
RV96. 49.75m. Moscow. Good at midnight.
VQ7LO. 49.32m. Nairobi. Fair strength at 5.0 a.m.
HP5K. 50.00m. Panama City. Good at 10.0 p.m.
XYZ. 49.94m. Rangoon. Very loud at midnight.

OVERSEAS BROADCASTERS

ENGLAND.—During the last few weeks there has been some difficulty in hearing the 13 and 16 metre band stations from Daventry, due to the rather premature change in receiving conditions. By the time this is in print, the position will probably have been remedied. At other times, however, notably 6.50 a.m., when GSC gives the news, also when GSB opens at midnight, very good reception is obtained.

ITALY.—The Rome stations are still giving us some very enjoyable programmes in the early morning through the stations in the 31-metre band, and also in the late afternoon on the same channel. In addition to these broadcasts, 2RO8 in the 16-metre band is heard at quite good strength from 8.0 p.m. till just after 10.0 p.m. Interesting programme booklets are sent to those interested.

PHILIPPINE ISLANDS.—One of the best of the Manila stations is KZRH in the 31-metre band, which now comes in at great strength. On a Thursday night from 11.0 a very amusing amateur hour takes place, with very frequent and justified use of the gong. The other Manila station, KZRM, on 31.35m., is also very well heard.

PORTUGAL.—The National station in Lisbon is still coming in at very good strength in the mornings through CSW7 on 30.8m., and both classical and popular music are pleasantly given at alternate intervals. For those who care to stay up late, the other Lisbon station, CSW4 in the 19-metre band, can also be heard at 2.0 a.m.

USA.—Probably the best United States station at the present time is WGEO on 31.48m., which is heard at really good entertainment level in the mornings around 7.0. At the same time, the other U.S.A. stations, WCBX, WPIT and WRUL, in the 25-metre band, can also be tuned-in at sufficient strength to enjoy their varied programmes.

CHINA.—The best of the Chinese stations is undoubtedly ZBW3, which has increased in strength greatly recently, and is now one of the loudest 31-metre band stations. A recent addition to the 31-metre band at night is XGOY, which is using 31.12m. opening at midnight with the news in English given by a lady. Some quite late news items are frequently heard from this station.

INDIA.—From many readers we have received comments on the strength of VUD2 on 31.28m., and it certainly is an outstanding station, despite the fact of much of its programme being of a native type. Do not neglect the other Indian stations in the 61-metre band, as they can frequently be heard, despite the static which is usually prevalent.

RAY SIMPSON'S PAGES

GREEK STATION TESTING

NEW FRENCH AND CUBAN

In the past, Greece has been one of the few European countries which has not used the short wave bands either for entertainment or propaganda purposes, but this position has now been altered with the forthcoming opening of the new station which is located in Sparta.

READERS will remember in our last issue we gave a list of the call-signs and frequencies to be used by this new transmitter, and since writing that paragraph we have heard one of them already on the air testing. The particular station heard was SVJ on 9825kc., 30.53m., which we first heard on the night of February 8 from just after 11.0 p.m. until nearly midnight. We have checked all the other frequencies, but up till the present SVJ is the only one we have heard. Readers should keep a look-out, however, for some of the other ones, as they will probably start testing in the near future.

PARIS ON 31.51M.

The French short-wave stations will soon rival Daventry and Berlin in the number of transmitters in operation, as they have recently opened another on 9520kc., 31.51m., which can be heard opening every morning at 7.30 a.m., and also at much better strength in the afternoons when they have a talk in English at 3.30 p.m. We have also heard this station on some nights at 10.30 p.m., but at this time is again very weak.

While speaking of the French stations readers should note that according to the latest list received direct from "Paris Mondial," the station on 11,718kc., is now listed as TPB7, while that on 11,885kc. is given as TPA4, which is at variance to what has been generally accepted. The new station on 9680kc. is TPC28, while that on 11,845kc. is TPC8.

NEW CUBAN STATION

On Sunday afternoon, February 11, we heard another new Cuban station, COCY, located in Havana, which was relaying the programme of broadcast band station CMBX. The wave-length in use was 32.56m. or 9205kc., which is between the two other Cubans, COCX and COBC. The broadcast station CMBX used to be relayed by short-wave station COBX, but this one has now left the air. This new station, COCY, gives its call every fifteen minutes in Spanish, and at the half-hour and hour also gives it in English. The address appears to be San Rafael, Havana, and it can now be heard at fair level from 11.0 p.m., and also much louder between 7.0 a.m. and 8.0 a.m.

XGOY ON 31.1M.

Every night at midnight a Chinese station opens on 9645kc., with lady announcer, who gives the call letters XGOA, XGOY, and XTFA. Immediately following this announcement a very good news session in English is given. It is hard to gather which station this actually is, and may be XGOY or XTFA, but we think it is the former.

A NEW CZECH TRANSMITTER!

MAY BE TRANSMITTING UNDER REBELS

The possibility of "Radio Czechoslovensko" being a station operating under rebels against the Nazis seems more than likely. Several singular points about transmission make its activities highly suspicious.

We are still hearing this new station which we mentioned briefly in the Stop Press last month, but we have still heard no English announcements.

At 5.0 a.m. they are very good strength, but by 7.0 a.m. are badly interfered with by WBOS and the mystery Colombian station.

Judging by the news sessions given in French and Czech, we have an idea that this station is what might be termed a rebel station, as under the present political position of the country one would expect frequent announcements in German, or at least the German National Anthems on closing, but these are never given. However, considering its strength, it is hard to believe it is an unauthorised station.

The advent of this Czech station has completely eliminated any chance of identifying the Colombian station, which is only about 5kc. away. In fact at 7.30 a.m. we have WBOS, KZRM and the Colombian all on 9570kc., and also the Czech only a few kc. away, making one continuous squeal.

FIRST YEAR OF S.W. LISTENING

WITH RADIO & HOBBIES

With this issue we complete our first year with "Radio and Hobbies."

During this period "Radio and Hobbies" was the first Australian radio magazine or paper to report a large number of new stations, or stations heard for the first time in this country.

In this category we notice over 50 call-signs, including LYR, CB1174, Eire, GRX, HNF, MTCY, CSW8, TILS, ZP14, ZTE, HJFK, and COHI.

New stations are the "bread and butter" of the keen DX-er, as they give added zest to the hobby when they are heard for the first time.

One thing we have tried to maintain—accuracy in call letters and frequencies. We are pleased to say, very few errors have occurred. In cases where we have inadvertently given incorrect information, this has been correct in the next issue.

We realise that all readers do not perhaps appreciate all sections of our short-wave notes, but they must remember that we try to serve both the experienced short-wave listener and also those who may be just commencing our hobby.

We therefore issue an invitation to all our readers to write us showing the regular short-wave features in their order of preference, so that we can make any necessary alterations which appear to be desirable.

THANKS!

We would like to take this opportunity of thanking all our regular correspondents who have contributed so much to whatever success we may have attained in our first year of publication.

Without reports from our readers we could not hope to present such extensive station listings as we do. By acknowledging readers' names after each station, other listeners can see if the particular station is being heard in various locations, and thus be able to judge whether they themselves should also hear it.

In addition to correspondents mentioned above, we would like to extend our thanks to the International DX-ers Alliance in the U.S.A. for their kind permission to reprint items from their own magazine.

Let us hope at the end of our next volume we can feel we have adequately served all short-wave listeners who have followed our notes during the preceding twelve months.

1940 DX CONTEST!

Open To All Our Readers

VALUABLE PRIZES OFFERED

In response to requests from many of our readers, we have pleasure in announcing a DX reception competition, which will be open to all listeners in Australia, New Zealand, and any of the Pacific Islands. Due to the fact that it is now rather difficult to obtain verifications from many of the European countries, we have decided to confine this competition to stations located in North, Central, and South America, and also the West Indies.

WE imagine this contest should prove very popular, as it will give readers an added interest in logging the many Spanish-speaking stations which have a fascination all their own, while the inclusion of the United States stations will enable all entrants to compile a good number of points.

During the course of the competition, all possible help will be given in the Listen For These pages, as an aid to listeners in identifying the difficult stations. In this issue will be found a Spanish pronunciation list, which should be of great assistance both to entrants in the competition and also all other listeners.

VALUABLE PRIZE FOR WINNER

The prize offered in this competition is a "Sky Pal Magic Unit," kindly donated by the manufacturers, Messrs. Craven, Wylde, Pty., Ltd.

To the best of our knowledge, this is the most valuable S.W. trophy ever offered by an Australian magazine.

Should the winner of the competition have already purchased a "Sky Pal Magic Unit," during the course of the competition, Messrs. Craven Wylde will refund him the full purchase price in cash. This generous offer should be an added incentive to all intending competitors.

COMPETITION RULES

1. The competition shall be open to all short-wave listeners resident in Australia, New Zealand or Pacific Islands.

2. The winner of the trophy shall be the entrant who obtains the greatest number of points for verification from commercial short-wave phone stations located in North, Central, or South America, West Indies, and adjacent islands, in the period between January 1, 1940, and June 30, 1940, both dates inclusive.

3. For the purposes of this competition, a commercial short-wave phone station shall be deemed one which for commercial or experimental purposes, radiates speech or music on any wavelength between five and 100 metres.

4. Verifications from amateur experimental stations will not be eligible for this competition.

5. In the event of two or more entrants tying in the number of points, the judges reserve the right to decide which has the most meritorious receptions.

6. All QSL cards or letters must definitely state that reception is verified, and not just acknowledge receipt of letter, and must bear a date in the period mentioned in rule. 2. (Where no date is mentioned on actual verification, a postmark on the card or envelope will be accepted.)

7. Any number of verifications from the same station will be accepted, provided they are for reception on different frequencies, which must be shown on each verification submitted.

8. Points for verifications shall be allotted on the following basis:—Australian listeners: One point for each accepted verification. New Zealand and Pacific Island listeners: One point for each accepted verification, less a handicap deduction of one point for every five or less points gained.

9. Entrants in the competition must submit lists of the stations received by July 8, 1940, while verifications must be available for inspection on request by August 12, 1940.

10. The judges will be the Editor and Short-wave Editor of "Radio and Hobbies," and entrants agree to accept their decision as final and legally binding.

RANDOM JOTTINGS

KZRH now on announced frequency of 9640kc.—TIPG is now varying in frequency between 9610 and 9620kc.—Moscow again using 31.51m. in night session.—Radio Saigon gives news in English at 1.30 a.m.—KZRH gives a very good uncensored news session at 11.45 p.m.—XEWW will increase power to 200kw.—YUC now also being heard opening at 4.30 p.m. at good strength.—Howard King is the engineer at KGEI.—LYR, in Lithuania, again being heard on Sunday nights at 11.0.—Paris has discontinued the use of the 19-metre band station at night.—No English announcements from Colombian stations during the war.

FLASHES from EVERYWHERE

U.S.A.

The well-known Boston station, WBOS, has recently been assigned the following additional frequencies: 6140 kc., 15,210kc., and 21,540kc. As readers will note, these frequencies will be shared with the Pittsburg station, WPIT. The other Boston station, WRUL, has applied for permission to use 50kw.

JAMAICA

The one-time amateur station, VP5PZ, is now working as a commercial on 4800kc., 62.5m. This frequency is not very suitable for Australian listeners, but if station is heard reports should be sent to Mrs. A. Lind-Allwood, "Vermont," Chapelton, Jamaica, B.W.I.

IRAN

Readers should keep a look-out for the new 25kw. station in Teheran, which should soon be working under the call of EQC on 9680kc., 30.99m. The equipment for this station has already been shipped by the manufacturers in England.

BOLIVIA

Short-wave stations in this country have always been hard to log, but with the opening of the following new stations in the 31-metre band, reception should be very much easier. The new ones are CP6 on 9520kc., CP24 9510kc., and CP36 9505kc. All these stations will be at La Paz. (Globe Circler.)

HUNGARY

The broadcasting authorities in Budapest will again carry out experimental broadcasts up till February 12 on HAD 7220kc., 9625kc., 11,850kc., and 21,680kc. Possibly a further series of tests will be carried out at a later date. (Globe Circler.)

CUBA

According to advice received from this country, an attempt is to be made to compel the short-wave stations in Cuba to adhere to their assigned frequencies. The idea is a good one, but past experience makes us very doubtful as to the probable success of the move.

URUGUAY

We learn from the IDA that this country will shortly have two more short-wave stations, both in the 25-metre band. The first one is CXA7, located in Montevideo, on 11,480kc., 26.13m., and the other is CXA14 on 11,825kc., 25.37m. This latter one is in Colonia, and known as "Radio El Mitro."

LITTLE AMERICA

Another new country has been heard recently, being the Byrd Antartic Expedition which is now located in Little America. At the time we heard this station, it was operating under the amateur call of K4USC, which is the call assigned to the Snow Cruiser.

THE frequency at this time was 14,150kc., but this same transmitter may also be heard later using the commercial call of KRTA on any of the following frequencies, 6425kc., 9135kc., 11,060kc., 12,862kc., 23,100kc., or 30,660kc. When the bases are established, the commercial call of the West Base will be KRTK, while that at the East Base will be KRTC. These base stations are expected to be in operation by March. Mr. R. K. Clack has also already heard K4USC working other amateurs around 10.0 p.m.

ULTRA-HIGH FREQUENCIES

IT is some time since we have had anything to say about the U.H.F., but this has been mainly due to the fact that they have not been heard to any great strength. In fact, the whole situation in this section of the spectrum appears to be in the melting pot, what with frequency modulation stations coming on the air, not to mention the television outlets.

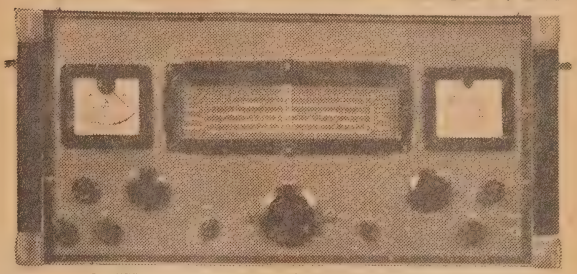
According to advice just received from our friend, Mr. Perry Ferrell, jun., who is the undoubted leader in all matters connected with U.H.F. bands, the following 11-metre band stations have all left the air:—W9XUP, W8XNO, W6XKG, W9XTC, W9XUY, W3XEY, W3XEX, W8XAI, and W8XOY.

ACTIVE 11-METRE STATIONS

At the present time the active stations on the 11-metre band are W8XUJ, Cincinnati ;W2XWE, Albany, N.Y.; W9XZY, St. Louis, Mo.; W8XUM, Columbus, Ohio; W2XJI, New York; W5XD, Dallas, Texas; W9XLA, Denver, Col.; W9XPD, St. Louis, Mo.; W8XNU, Cincinnati; W4XBW, Chattanooga, Tenn.; W9XA, Kansas City, Mo.; W9XH, South Bend, Ind.; W9XJL, Superior, Wis.; and W1XA, Nashville, Tenn.

Moving still lower in wavelength, we advise all U.H.F. listeners to try for KQAI, Beverly Hills, Cal., and KQAS, Palm Springs, Cal., both of whom are on 37,100kc.; then there is also W6XDA, in Los Angeles, on 42,300kc., which we feel sure will eventually be heard in this country.

12 VALVE SKY RAIDER COMMUNICATIONS RECEIVER



9—555 metres. A.C. ELECTRIC OPERATION.

SLIDING COIL BOX BAND CHANGER

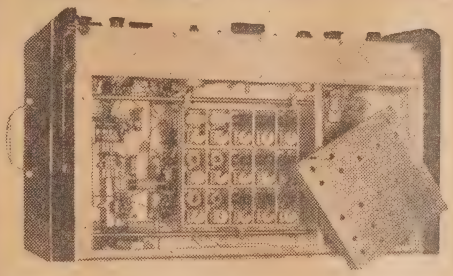
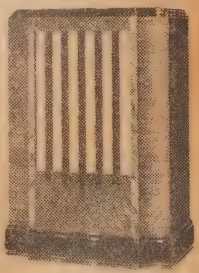


Illustration at left shows sliding coil box with cover removed. Note the coils with air dielectric trimmers mounted in separate shielded compartments. A knob on the front panel sets the coil box in operation.

For years, short wave enthusiasts have cast longing eyes at illustrations and specifications of American communications receivers. The prohibitive cost, running into something like £100, has always been the obstacle to acquiring one. This Sky-Raider, wholly produced in Australia, has all the refinements of the most expensive imported sets and in performance it is comparable with the world's best! And yet, with all its magnificence its price is within the reach of the average home! Easy terms available!

SPEAKER CONSOLE



This speaker console is a floor model to house the special 12-inch concert speaker. Cabinets to house both set and speaker available if desired.

SENSATIONAL FEATURES!

- Completely shielded sliding coil box band changer.
- New type semi-automatic noise silencer.
- Dual scale calibrated dial (band set and band spread).
- Beam Power Output (6L6G) with inverse feedback.
- Giant transformer—hum-free filter system.

HERE IS MORE SENSATIONAL NEWS!

A NEW SKY PAL MAGIC UNIT!

Coverage extends to 9 metres! The Sky Pal completely revolutionises the reception of dual wave sets—brings in previously unheard stations—makes weak stations like locals—removes background noise! Easily installed—no coils to change—no connection to power point! AVAILABLE ON EASY TERMS. FREE DEMONSTRATION!

CRAVEN WYLDE PTY. LTD.

MANUFACTURERS AND SOLE DISTRIBUTORS SKY-RAIDER RADIOS. Phone BW4038

10 BARRACK ST., SYDNEY. (right next door to Lottery office)

THIS MONTH'S VERIFICATIONS

WE have received the following verifications from stations logged during the last few months. Stations so verified are listed each month.

XEQQ.—9680kc., 30.99m., Mexico City, Mexico. We were very pleased to receive a letter of verification from this station, "Radio Panamericana." We thus have it verified before it has been reported elsewhere in Australia. Address is Apartado 950, Mexico City, Mexico.

COHI.—6440kc., 46.58m., Santa Clara, Cuba. The manager of this station, Senor Leopoldo Jarez, sent us a very interesting letter verifying our report of December 1. He asks for further reports from any other Australian listeners. Their address is Parque Vidal No. 5, Santa Clara, Cuba.

HS8PJ.—9510kc., 31.55m., Saladaeng, Bangkok, Thailand. The manager of the Department of Publicity, Mr. Soontorn Hongladaromp, in verifying our reports on HS6PJ and HS8PJ, enclosed a very attractive card, and also promised a photograph of the studio and transmitter. The above stations have, of course, been replaced by HSP6 on 37.65m.

WCAB.—9590kc., 31.28m., Philadelphia, Pa. Quite a plain card is sent by this station verifying our reports on their 9590kc. and 15.270kc., transmissions. New beam antennas are shortly to be used at this station.

VLW.—6130kc., 48.93m., Perth, W.A. We are afraid our overseas friends will not be very impressed with the plain black and white card sent by this station verifying our reports on VLW, VLW2 and VLW3. The cards are issued by D. McVey, Director-General, P.M.G. Department.

WRUL.—6040kc., 49.67m. We were very pleased to get this University Club verification card, as they mentioned on it that ours was their first report from Australia on their 49-metre band station, WRUL. The card was their usual blue and white one.

STOP PRESS

The Colombian station on 9570kc., 31.35m., has been identified as **HJAB**, Barranquilla. This is harmonic of fundamental freq. 4785kc., 62.7m.

MORE NEW STATIONS HEARD

HP5G.—11,780kc., 25.47m., Panama City. Testing on Sunday, February 18, till 6.0 p.m.

HJAG.—9810kc., 30.58m., Barranquilla. Heard often 7.0 a.m. relaying HJAH. This is harmonic of fundamental freq. 4905kc., 61.16m.

HJFH.—9750kc., 30.77m., Armenia, Colombia. This is harmonic of 4875kc., 61.54m. Opens nightly at 11.0 p.m. with march, then three chimes.

Delhi.—11,870kc., 25.27m. Opens 9.30 p.m., announces as Delhi. This freq. is assigned to VUM2, Madras, so may be Madras relaying Delhi.

DJW.—9650kc., 31.09m., Berlin. Heard well in afternoon at 5.0 p.m.

DJL.—7290kc., 41.15m., Berlin. Heard faintly, closing at 7.30 a.m.

Admiral Byrd's "Snow Cruiser"

Aboard the "Snow Cruiser" is located the radio transmitter, which uses the call letters KC4USC or KRTA.

A DAY ROUND THE TUNING DIAL

DAYLIGHT RECEPTION IMPROVING

One of the most gratifying points of reception during the last few weeks has been the improvement in daylight hours both on the 25 and the 31 metre bands. If this improvement is maintained, listeners will soon be able to log quite a number of stations which have not been audible since last season.

WITH a view to ascertaining at what time the afternoon stations became audible, we listened continuously from about 1.0 p.m. on one Sunday afternoon.

At 1.30 p.m. both the Germans on the 31-metre band could be heard, while by 2.0 p.m., GSB was faintly audible. On the 25-metre band CD1190 was heard closing at 1.30 p.m., and by 2.0 p.m. CB1170 was faintly audible just as it closed.

An hour later the 31-metre band was quite active when all of the following could easily be identified, XEWW, WBOS, WCAB, CXA8, CB960, XEQQ, and also most of the Cubans. In a few weeks' time an excellent time should be had chasing these North and South American stations.

Another sign of the change in seasonal conditions has been the weakening of the Daventry stations in the 13-metre band. On some nights they are now practically inaudible, though, of course, these stations will not disappear all at once, and may stage a partial recovery for a week or so.

U.S.A. REACTION TO VLQ

By last mail we received one or two letters from the United States in which the writers expressed their appreciation of the programmes broadcast from our new stations, VLQ, etc.

Evidently, reception has been quite good in that country, though we should imagine they must have experienced a certain amount of interference. This latter problem will probably be overcome in the future, as the 31-metre band station VLQ is now alternating between 9615kc. and 9680kc.

Personally, we think a much better choice would have been 9660kc., as this is practically a free channel, the only stations assigned to it being LRX and HVJ. We should imagine it would be useless trying to reach Europe on 9680kc. if TPC28 was on the air at the same time.

As our next issue will be published approximately four weeks after this one, would our various correspondents kindly let us have their reports on or before Monday, March 11?

NEWFOUNDLAND On 31-METRE BAND

THE short-wave station, VONG, located in St. John's, which has up to the present only been using the higher wavelength of 50.17m., has now also obtained a frequency in the 31-metre band, namely, 9475kc., 31.67m., and occasionally uses this channel from 10.30 p.m. till 3.30 a.m., and also from 7.30 a.m. till 11.30 a.m. Reception of this station is quite possible in this country, the best time to look for it being either around 7.30 a.m. or 10.30 p.m. They rebroadcast the programmes of VONF of the same city.

Listen for these!

OVERSEAS STATIONS NOW AUDIBLE

Here is a list of short-wave stations which have actually been heard over the last few weeks. Most of these should be heard by any of our short-wave fans who have a good set and location. Details of each station are given, and when also reported by readers, their names appear in brackets.

ENGLAND

GSA.—6050kc., 49.56m., Daventry. Now only weak at 6.0 a.m., but is heard at fair strength in the evenings around 6.0, and quite well at 3.0 a.m. (Foster, Lee, Medina, Cox.)

GSB.—9510kc., 31.55m. This ever-popular station is very loud at midnight, and also good on opening at 6.50 a.m. (Foster, Lee, Cox, Medina.)

GSC.—9580kc., 31.32m. Very good between 6.0 a.m. and 6.30 a.m., and also on reopening at 6.50 a.m. with the news. (Foster, Lee, Medina, Cox.)

GSD.—11,750kc., 25.53m. This station is being heard at good strength nightly till midnight, also good at 7.0 p.m. (Foster, Lee, Medina, Gaden, Cox.)

GSE.—11,860kc., 25.29m. This 25-metre band Empire station is heard well from 6.30 p.m. (Foster, Medina, Cox.)

GSF.—15,140kc., 19.82m. This 19-metre band station is being heard well at 7.0 p.m. (Foster, Lee, Medina, J. F. Emery, Cox.)

GSG.—17,790kc., 16.86m. On some nights this station is not operating, but when on can still be heard at good level. (Foster, Lee, Medina, J. F. Emery, Gaden.)

GSH.—21,470kc., 13.97m. This one is very weak at most locations now, but improves occasionally. (J. F. Emery, Gaden.)

GSI.—15,260kc., 19.66m. Not as strong as it used to be, but still quite audible. (Foster, Lee, Medina, J. F. Emery, Cox.)

GSJ.—21,530kc., 13.93m. Now only heard at weak strength, and at some locations is inaudible. (Lee, J. F. Emery, Gaden.)

GSO.—15,180kc., 19.76m. This one has been heard at fair strength in the early morning. (Medina, Gaden.)

GSP.—15,310kc., 19.6m. Now only heard at fair strength at 6.30 p.m. (Foster, Lee, Medina, Cox.)

GST.—21,550kc., 13.92m. This one is practically inaudible now, and of no entertainment value. (Gaden.)

GSV.—17,810kc., 16.85m. Although weaker than a few weeks ago, can still be copied after 11.0 p.m. (Medina.)

GSW.—7230kc., 41.49m. On some days is heard well in the afternoons, and also in the early hours. (Medina, Cox.)

GRX.—9690kc., 30.96m. Has improved greatly around 6.0 p.m., and can also be heard in the early morning. (Foster, Lee, Medina, Cox.)

FRANCE

TPA2.—15,245kc., 19.68m. This transmitter has been discontinued in the night session from 8.0, but heard at 11.45. (Medina, Lee, Battis.)

TPA4.—11,885kc., 25.24m. Heard quite well in afternoon till 3.30, and also at night, but much weaker. Best at 10.0 p.m. (Hallett, Battis, Medina.)

TPB3.—17,775kc., 16.88m. This station is giving very good service nightly from 8.0. News at 9.0. (Medina, Lee, Foster, Battis.)

TPB7.—11,718kc., 25.6m. This transmitter is heard well in the afternoon till 3.0. News at 3.15. (Medina, Hallett, Foster.)

TPB11.—7280kc., 41.21m. Can still be heard in the early morning at some locations around 6.30, but is very weak. (Lee, Medina.)

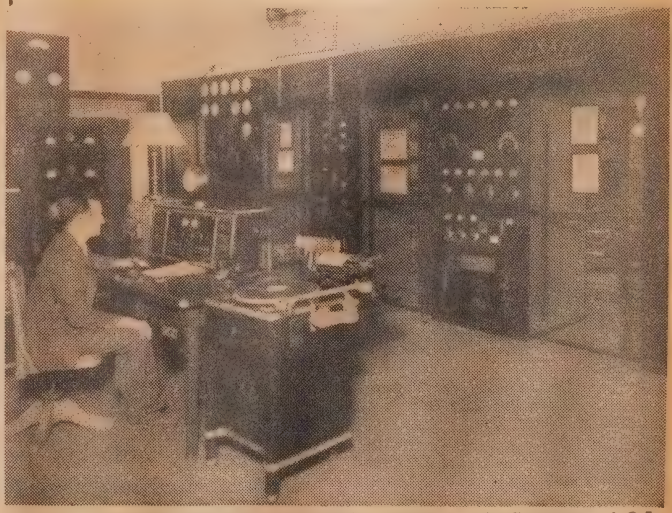
TPC8.—11,845kc., 25.33m. One of the best stations in the 25 metre band at 7.0 a.m. Closes at 7.15 a.m.

TPC28.—9680kc., 30.99m. Used at various times, best in late afternoon; also heard in early morning. Gives news at 6.15 p.m. (Foster, Hallett, Medina.)

. . . .—9520kc., 31.51m. New station. Opens at 7.30 a.m., also heard till 3.30 p.m., and reopens at 3.45 p.m. (Hallett.)

. . . .—9625kc., 31.19m. This is another new French station heard on several occasions between 6.0 a.m. and 7.0 a.m., but very weak.

FAMOUS AMERICAN TRANSMITTER



Control panel, intermediate and power-amplifier stages of Radio Transmitter of G-E International Short-Wave Broadcast Stations W2XAD andW2XAF, at South Schenectady, N.Y., now known as WGEA and WGEO.

WE list below all definitely identified new stations, or those heard for the first time. In cases where actual letters are not known, the station will be listed under its location until such time as its call can be definitely given.

KC.	Metres	Call	Location
9205	32.56	COCY	Havana, Cuba.
9520	31.51	———	Paris, France
9565	31.36	"Radio Czecho-slovensko"	Bohemia.
9695	30.95	JVZ3	Tokio, Japan.
9810	30.58	HJAG	Colombia, S.A
9825	30.53	SVJ	Sparta, Greece.

FREQUENCY CHANGES

VLQ	9680kc.	from	9615kc.
KZRH	9640kc.	from	9635kc.
COCH	9440kc.	from	9437kc

CENTRAL AMERICA AND WEST INDIES

COCW.—6330kc., 47.39m., Havana, Cuba. Very weak on opening at 11.0 p.m. and fades out by 11.15 p.m.

COCQ.—6395kc., 46.92m. Same location. Quite fair at 10.0 p.m., but wanders in frequency.

COCQ.—8830kc., 33.98m. Same location. This outlet is much louder than the higher wave-length. (Foster, Cox.)

COHI.—6460kc., 46.44m., Santa Clara. One of the best Cubans on the air from 10.0 p.m. (Foster, Medina.)

COCO.—8700kc., 34.48m., Havana, Cuba. Another Cuban heard nightly from just before 10.0 p.m.

COBZ.—9025kc., 33.13m. Same location. This one is fair from opening at 11.0 p.m.

COCX.—9190kc.. 32.63m. Same location. Improved very much lately, and now the loudest of the Cubans from 11.0 p.m.

COBC.—9360kc., 32.04m. Same location. Quite easy to hear this one from opening at 10.0 p.m. (Foster, Cox.)

COCH.—9440kc., 31.78m. Same location Fair strength, but interfered with by morse. Notice slight change in wave-length. (Cox, Medina.)

COCM.—9815kc., 30.57m. Same location. Opens at 10.45 p.m., after playing test records from around 10.35 p.m.

COGF.—11,800kc., 25.42m., Matanzas. Not heard at night, but comes in faintly in early morning.

TIEP.—6695kc., 44.81m., San Jose, Costa Rica. Now being heard every night from 10.30. Gives call very slowly.

TIPG—9615kc., 31.21m. Same location. Very good when VLQ is off the air; also heard around 8.0 a.m. (Medina.)

TILS.—6165kc., 48.66m. Same location. This station is very irregular in operating, but occasionally heard after 10.0 p.m.

TGWA.—15,174kc., 19.77m.; Guatemala City, Gutaemala. On a Monday morning is the best station on the band till around 8.0. (Cox, Medina.)

TGWA.—9685kc., 30.98m. Same location. Still being heard in the afternoons with frequent English announcements. (Cox, Medina.)

TGWB.—6480kc., 46.28m. Same location. On some nights this one is heard at fair strength after 10.45.

TGQA.—6400kc., 46.88m., Quezaltenango, Guatemala. Heard on Sunday night from 10.30. (Foster.)

HP5A.—11,700kc., 25.64m., Panama City, Panama. Improving now and will soon be quite loud after 10.0 p.m. (Medina.)

HP5J.—9610kc., 31.2m. Same location. During breaks in session from VLQ this Panama station can be easily heard.

HP5K.—6000kc., 50.00m. Same location. Still being heard at night opening with "Merry Widow" at 10.0 p.m., English announcement.

RADIO MARTINIQUE. — 9720kc., 30.86m., Fort-de-France, Martinique. Only heard on two occasions very weakly at 8.30 a.m. (Medina.)

COCY.—9205kc., 32.56m., Havana, Cuba. This is the new station mentioned elsewhere.

TG2.—6190kc., 48.47m., Guatemala City, Guatemala. Heard at good strength on Sunday nights from 10.30 (Cox, Medina.)

ITALY

2RO3.—9630kc., 31.15m., Rome. Still very good at 4.30 p.m., but morning signal has dropped in level. News at 4.20 and 7.10 a.m. (Foster, Cox, Medina, Lee.)

2RO4.—11,810kc., 25.4m. Still heard well in early hours, but only fair at night. (Medina, Foster, Cox.)

2RO6.—15,300kc., 19.61m. Heard best in the very early morning, around 2.0, but also audible at 6.0. (Medina, Cox.)

2RO8.—17,820kc., 16.84m. Now giving an excellent service at night until 10.25. Also heard weakly in forenoon. (Medina, Foster, Lee.)

2RO9.—9667kc., 31.03m. This station has improved greatly in the mornings at 7.0, and is better than 2RO3. (Medina.)

2RO12.—15,100kc., 19.87m. Occasionally heard in the mornings, just after 7.0, but never very loud.

2RO14.—15,230kc., 19.7m. Never very loud, but can usually be heard at about 10.0 p.m. Occasionally heard at 7.0 p.m.

2RO15.—11,760kc., 25.51m. Fair strength at night, but interfered with by GSD.

IRF.—9830kc., 30.52m. This is a very loud station when heard in the mornings, about 5.0.

NORTH AMERICA

WBOS.—9570kc., 31.35m., Boston, Mass. Heard best in afternoon from 4.30 p.m. till 5.0 p.m. (Foster, J. F. Emery, Cox.)

WRUW.—15,130kc., 19.83m. Same location Can still be heard in the mornings at 7.0 a.m. (Foster, Lee, Medina.)

WRUW.—11,730kc., 25.58m. Same location. From 7.30 a.m. this one can be heard at fair strength on most mornings. (Lee.)

WRUL.—11,790kc., 25.45m. Same location. Another of the University Club stations, heard well at 7.0 a.m. (Cox, Medina.)

WCAB.—9590kc., 31.28m., Philadelphia, Pa. Heard weakly in the mornings as 3.30 p.m. News at 4.55 p.m.

WLWO.—6060kc., 49.5m., Cincinnati, Ohio. Heard very faintly in the late afternoons, and also at night. (Foster, Cox.)

WPIT.—15,210kc., 19.72m., Pittsburg, Pa. On some night this one is fair strength from around midnight.

WCAB.—15,270kc., 19.64m., Philadelphia, Pa. Heard weakly in the morning around 8.0. (Lee.)

WPIT.—11,870kc., 25.27m., Pittsburg, Pa. Not as strong as last month, but audible every morning at 7.0. (Lee, Foster, Cox, Medina.)

WNBI.—17,780kc., 16.87m., New York, N.Y. Still being heard in the forenoons with fair signal. (Lee, Foster, Gaden.)

WRCA.—9670kc., 31.03m. Same location. Heard best in the afternoon till closing at 4.0 p.m., also heard opening at 7.0 a.m. (J. F. Emery, Cox.)

KGEI.—9530kc., 31.48m., Treasure Island. Very poor at night, but good in the very early morning. Good at 5.30 p.m. (Foster, Lee, Cox, Medina.)

KGEI.—15.330kc., 19.57m., Treasure Island. Very weak in the South American programme around 1.30 p.m. (Cox, Medina, Gaden.)

WCBX.—15,270kc., 19.64m., New York, N.Y. Heard at fair strength in the morning at 6.0. (Foster, Cox, Medina.)

WCBX.—11,830kc., 25.36m. Same location. Now being heard very well between 7.0 a.m. and 8.0 a.m. (Lee, Medina.)

WCBX.—6170kc., 48.62m. Same location. Improving now in the late afternoon, till closing at 5.0 p.m. (Cox.)

WGEA.—15,330kc., 19.57m., Schenectady, N.Y. In the early morning can be copied at fair strength. (Medina.)

WGEO.—9530kc., 31.48m. Same location. This is a very good station in the mornings at 7.0. (Lee, Foster, Cox, Medina.)

WPIT.—6140kc., 48.86m., Pittsburg, Pa. Mr. Cox, of New Zealand, is hearing this one in the late afternoon.

XEQQ.—9680kc., 30.99m., Mexico City, Mexico. Coming in very well till closing at 4.0 p.m., and also heard opening with "Bolero" at 1.0 a.m. (Cox.)

XEWW.—9503kc., 31.57m. Same location. Has improved greatly in afternoon from 3.0, also heard at midnight. (Cox.)

XEXA.—6175kc., 48.58m. Same location. Now much improved from opening at 11.0 p.m.

INDIA AND ASIA

PLP.—11,000kc., 27.27m., Bandoeng, D.E.I. Fairly good in some locations and very good at others from 8.0 p.m. (Medina, Foster, Cox, Lee.)

PMN.—10,260kc., 29.24m., same location. This is much better than PLP, and really an enjoyable station. (Foster, Medina, Cox, Lee.)

PMH.—6720kc., 44.64m. Still being heard nightly with the native type programme. (Foster, Medina.)

YDC.—15,150kc., 19.81m., same location. Very good station at night with dance music. (Medina, Foster, Cox, Lee.)

YDB.—9550kc., 31.41m., Soerabaja. Has improved greatly at night, and is quite good towards 11.0. (Medina, Cox.)

YDX.—7220kc., 41.55m., Medan, Sumatra. Comes in very well late at night. (Medina, Foster.)

JVW.—7257kc., 41.34m., Tokio, Japan. This station can be heard well after 6.0 a.m., and closes at 7.0 a.m. (Foster, Lee.)

JLT2.—9645kc., 31.1m., same location. Only heard in the very early mornings. Opens at 3.15 a.m. (Medina.)

JLG3.—11,705kc., 25.63m., same location. This Japanese station gives news in English at 7.55 p.m. (Medina.)

JVW3.—11,720kc., 25.6m., same location. Heard at good strength every night at 7.0. (Medina, Foster, Cox, Lee.)

JVZ3.—9695kc., 30.95m., same location. This is new station heard nightly around 10.0.

JZK.—15,160kc., 19.79m., same location. Good in morning, news at 6.0 a.m., also a night, news at 10.30 p.m., fair in forenoon. (Medina, Cox, Lee, Gaden.)

JZJ.—11,800kc., 25.42m., same location. Heard best in the mornings at 7.30. (Medina, Lee.)

JZI.—9535kc., 31.47m., same location. Heard at night, but interfered with by other stations. News at 10.30 p.m.

JIE.—7295kc., 41.13m., Tyureki, Taiwan. Can still hear this station in early morning at 1.0.

JIE3.—9695kc., 30.95m., same location. Used at same time as JIE, and is the better of the two.

MTCY.—6125kc., 49.98m., Hsinking, Manchukuo. Quite a loud station, but only native type programme. (Foster, Cox, Lee.)

MTCY.—11,775kc., 25.48m., same location. Comes on the air at 7.0 a.m. with English announcement. (Medina.)

MTCY.—15,205kc., 19.73m., same location. Only heard weakly in the forenoon, opening at 11.30. (Medina.)

Radio Saigon.—11,780kc., 25.47m., Saigon, F.I.C. This is a very loud station every night. News at 9.15 p.m. or thereabouts. (Foster, Lee, Medina, Cox.)

ZHP.—9700kc., 30.94m., Singapore, S.S. Has improved in strength and can now be heard at good strength nightly. (Foster, Medina, Lee.)

ZHJ.—6080kc., 49.3m., Penang, S.S. Not exactly enjoyable, due to noise level, but heard best at midnight. (Medina, Foster, Lee.)

XYZ.—6007kc., 49.94m., Rangoon, Burma. Another Asian station which is heard every night from about 11.0. (Foster.)

VUD2.—9590kc., 31.28m., Delhi, India. This is a very good station now every night. News at 10.30 p.m. (Medina, Foster, Lee, Battis.)

VUD3.—15,290kc., 19.62m., same location. This one is now heard best at 6.0 p.m. (Medina, Gaden.)

VUD8.—4960kc., 60.48m., same location. Also heard in parallel with VUD2 at night. (Lee, Battis.)

VUM2.—60.98m., **VUB2**, 61.48m., and **VUC2**, 61.98m., all heard at night around 10.30, but rather noisy. (Lee.)

KZRH.—9640kc., 31.12m., Manila, Philippine Is. One of the best of the Manila stations, with some good programmes. (J. F. Emery, Medina, Cox, Foster, Battis, Lee.)

KZRM.—9570kc., 31.35m., same location. Also an excellent station every night, and can also be heard opening at 7.30 a.m. (Medina, Foster, Lee, Cox, J. F. Emery, Battis.)

KZIB.—9492kc., 31.6m., same location. Not as loud as the two other Manila stations on this band, but heard nightly. (Medina, Foster, J. F. Emery, Cox, Lee.)

KZIB.—6040kc., 49.67m., same location and same station, but not as good as the 31-metre band outlet. (Medina, Foster, Cox, Lee.)

KZEG, KZRF.—6140kc., 48.86m., same location. This is the best station on the 49 metre band at night. (Medina, Foster, Cox, Battis, Lee.)

HSP6.—7968kc., 37.65m., Bangkok, Thailand. Comes in very well on opening at 11.0 p.m. (Foster, Medina.)

XGOY.—9500kc., 31.58m., Szechwan, China. This frequency has again been taken into use in the mornings. Heard from 6.30.

XGOY.—11,900kc., 25.21m., same location. Heard at good strength every night. News at 9.20 p.m. and midnight. (Medina, Cox, Foster, Battis, Lee.)

XGOY/XTFA.—9645kc., 31.1m. This is the new one, opening at midnight with news in English.

XGSE.—9840kc., 30.47m., China. Can still be heard opening at 11.0 p.m., but not as strong as last month.

XGOX.—15,200kc., 19.74m., Szechwan. Heard in the late afternoons, and gives news at 5.10 p.m. and 7.10 p.m. (Medina, Cox, Battis, Lee, Gaden.)

XMHA.—11,855kc., 25.3m., Shanghai. Not very loud, but is there every night, with typical American type programme. (Cox, Battis.)

XGOK.—11,650kc., 25.75m., Canton. This station gives Chinese type programme, but news in English at 11.15 p.m. (Medina, Foster, Lee.)

XPSA.—7010kc., 42.8m., Kweiyang. Not very strong, but audible nightly, and gives news at midnight. (Medina, Foster, Cox, Lee.)

XOJD.—6850kc., 43.8m., Hankow. This one is not very strong, and comes in best at 11.0 p.m. (Medina.)

XTC.—9295kc., 32.28m., Shanghai. Opens every night at 11.0, when it is fair strength.

ZBW3.—9525kc., 31.5m., Hongkong. Has improved very much lately, and can always be heard well. (Cox, Medina, Foster, Lee.)

CRY9.—6080kc., 49.34m., Macao, Portuguese China. This one has been heard again on Monday night at 11.45: English announcement.

SOUTH AMERICA

CB960.—9600ks., 31.25m., Santiago, Chile. Comes in best on Sunday afternoon till closing at 3.30 p.m. with piano number.

CB1170.—11,700kc., 25.64m., same location. Heard weakly in early morning, also in afternoon till 2.0.

CB1180.—11,970kc., 25.06m., same location. Now being heard at night, opening with news in Spanish at 10.0 p.m.

CD1190.—11,910kc., 25.19m., Valdivia, Chile. Closes with organ selection at 1.30 p.m., but still very weak. (Cox.)

OAX4J.—9340kc., 31.12m., Lima, Peru. Now being heard at good strength on Sunday afternoon till after 4.0. (Lee.)

OAX4T.—9556kc., 31.38m., same location. This one heard on several occasions, opening at 11.0 p.m.

OAX4Z.—6080kc., 49.34m., same location. Heard on two occasions as early as 9.0 p.m., but not regularly. (Cox.)

HJFK.—9730kc., 30.83m., Pereira, Colombia. One of the best stations from South America when it opens at 10.0 p.m. (Foster, Hallett, Battis.)

HJAB.—970kc., 31.35m., Colombia. Still being heard around 6.30 a.m., but difficult to understand, due to interference.

HCJB.—12,460kc., 24.08m., Quito, Ecuador. On some nights is good level by 11.0. (Medina, Foster.)

CXA8.—9640kc., 31.12m., Colonia, Uruguay. Getting louder on Sunday afternoons till closing at 4.30 or 5.0.

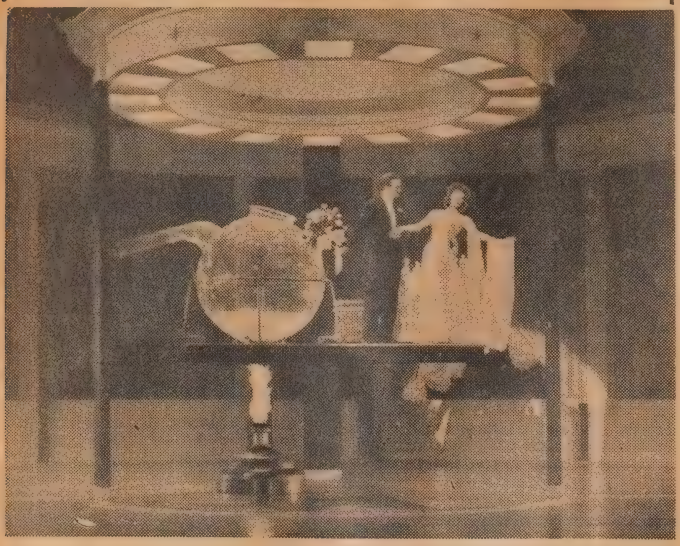
LRA1.—9690kc., 30.96m., Buenos Aires, Argentine. On Sunday and Monday morning can be heard weakly, opening at 9.0.

CB970.—9730kc., 30.83m., Valparaiso, Chile. Heard infrequently when it opens at 9.30 p.m., but is not a regular one. (Battis.)

HJAG.—9810kc., 30.58m., Colombia. This is the new station heard in early morning mentioned in separate article.

(Continued on Page 75)

MAGIC IN THE MOVIES



The lady in the picture is transferred by magic into the huge crucible standing on the table. A highlight of the picture "Eternally Yours."

At last the magic picture, "Eternally Yours," has been screened in Australia. This is the picture that magicians in America have been complaining about for so long because of the many deliberate exposures of excellent tricks and illusions.

THE picture itself is excellent, and the story quite good, but I do think that the exposures could have been left out without affecting the general excellence of the production. Certainly the exposures might add a certain amount of satisfaction for some persons, still the picture itself is such that it stands on its own feet without the necessity of exposing good illusions. I liked the picture, every inch of it—so will you.

MAGICIANS PROTEST

Magicians' clubs all over America are urging their members to write to the Motion Picture Producers and Distributors' Association in Hollywood, objecting to exposure of the secrets of magic in pictures.

They speak in such terms as "Magic in danger of destruction"; "Magic secrets revealed to all and sundry"; and I have no doubt that quite a large number of American magicians will complain in writing as requested.

In America, there are over fifteen thousand magicians—professional and amateur. The producer, Walter Wanger, stated that he would expose anything he pleased, and that magicians should invent new tricks. It is peculiar, too, that two of America's leading magicians should act as technical advisers for the picture. Paul Le Paul and Fred Keating were the magicians, and they also had small parts in the picture. Other leading magicians sarcastically say, "What price sabotage."

In the picture you will see many startling magical tricks and illusions. You will see David Niven, who takes the part of "The Great Arturo," perform a remarkable mid-air escape from handcuffs while making a 15,000ft. parachute jump from an aeroplane right over the New York World's Fair—it's thrilling.

LADY IN CRUCIBLE

An outstanding scene is where a young lady is "created" in a transparent chemist's crucible of unusual size. A clever thought-reading expose is also included, and a method of hypnotising a rabbit. Yes, there is much magic to interest the magician, professional and amateur alike, and not forgetting the average picture-goer. Magical apparatus was built by Thayer, well-known all over the world for his perfection in manufacturing magicians' wants.

NICOLA ON MINED SHIP

NICOLA THE GREAT, recently in Australia, was on his way home to America from his abbreviated world's tour on board the steamer Sirdhana, when it was sunk by a mine near Singapore. The ship went down in 15 minutes. Ten members of his company were among those saved, including Mrs. Nicola. Nicola lost all his elaborate magic equipment worth thousands of pounds, and not insured. Twenty-nine persons lost their lives. News from America tells me that Nicola will rebuild his great show and get ready for another tour.

* * *

CARDINI STARS

CARDINI, the world's greatest card manipulator, and well known in Australia, is now playing the leading theatres in America. His act continues to improve with time—if this is possible. It is reported that he got his first start in Australia on the old Tivoli circuit, and that Jack Musgrove gave him the name of Cardini.

* * *

WEIRDO IN SYDNEY

WEIRDO, clever Australian magician, has been appearing with his own full night magic show in Sydney recently. He is a clever and versatile performer, and readers of "Radio and Hobbies" living near Sydney should not fail to see his performance when he comes your way. It will be remembered that Weirdo appeared in "Radio and Hobbies" recently as a paperologist. There is hardly a thing that Weirdo cannot do with paper in the realm of things magic.

* * *

BATTLE-AXE JUGGLING

JIMMY WALLACE, Australia's youngest juggler, has just returned from a tour of Western Queensland, visiting the following towns: Longreach, Barcaldine, Blackall, Emerald, Alpha, Jericho, and many others. His great blindfold battle axe juggling was as usual a hit at every performance according to the press reports I have seen. During his trip, Jimmy met many readers of "Radio and Hobbies" who called on him—remembering his photographs and juggling hints in previous issues of "Radio and Hobbies." Jimmy would like to meet readers of this journal interested in magic, ventriloquism or juggling. Call on him when he is appearing at your local theatre.

NATE LEIPZIG
DIES IN NEW YORK

Nate Leipzig has passed on, he died in New York just before Christmas at the age of 66 years. He was one of the foremost magicians in the world, and acclaimed by his fellow conjurers as the greatest exponent of pure sleight-of-hand.

HIS family name was Leipziger, but he dropped the final syllable when he went on the stage. The funeral ritual of the Society of American Magicians was read by Dr. S. L. Grimby, president, and Julien Prokauer delivered a funeral address after the religious ceremony.

During his thirty-six years as a professional magician, Leipzig appeared at many Royal Command performances. Among those who witnessed his feats were King Edward VII. and King George V., and the Empress Eugenie of France, who noted in her diary: "Leipzig's conjuring tricks puzzled them all." He was 30 years of age when he gave up his position with an optical firm to become a professional magician. He appeared in England, America, Europe and Australia with great success, and was the first magician to receive the gold medal of the Magic Circle, London, for "supreme skill." He was born in Stockholm, Sweden, on May 31, 1873, and died in New York on October 14, 1939.

The Five Demons ready to present their unique show.

THE FIVE DEMONS GREET YOU!
SEND FOR THEIR PICTURE!

IN an earlier issue of "Radio and Hobbies," I wrote about the "Five Demons," a band of Sydney magicians whose small club of five members is the most unique in the world.

Here you see the "FIVE DEMONS" in their dressing-room at a Sydney theatre during the Christmas period.

If you would like a set of pictures showing the "Demons" in their exclusive den of magic, just drop me a note together with three penny stamps for postage, and I will forward you a set of nine pictures of the "Demons" for your collection. Nothing to buy. No puzzles to solve. Just send me your name and address and the stamps, and the pictures will be sent to you without delay, with the compliments of the "Five Demons."

Hey Presto! Abracadabra!

Things have been booming for Magic.

Many readers have sent me their programmes of Christmas performances given by them. A number of Press cuttings have also been sent to me, showing that Christmas entertainments for our Magician readers have been successful. Thank you all for the programmes and cuttings, I will place them in my scrap-book as happy remembrances of our associations in magic. I was particularly pleased to receive photographs from other readers.

Good news! During the month, I had the good fortune to be invited to spend an evening with Dr. C. H. Irving, who you will read about in my "WHO'S WHO" column. As a result I now have many new and interesting stories to tell you about great magicians, as told to me by him. I intend to pass these on to you from time to time under the heading of "Magical Experiences of Dr. Irving." They will interest and amaze you as they did me.

With several moving pictures at present showing in Sydney and throughout Australia, dealing with magic, illusions and magicians, magicians have been well catered for, proving that magic really does have a place in the interests of the general public. "Eternally Yours," and "Window in London," are the two most outstanding pictures featuring magic, at present being shown in Australia. It is a pity that there are several deliberate exposures of previously guarded secrets in one of the pictures. The story and interest of the picture is strong enough in entertainment value WITHOUT the exposure of really good tricks. What are your views? Drop me a line if you have seen the picture.

All readers who expect written replies to their questions in the Magic Section, DO NOT FORGET TO INCLUDE 2d IN STAMPS FOR REPLY. Be brief in your questions, and please do not forget to include your full name and address. Several readers have failed to give me their address, so if you have written to me and not received a reply, it will be wise to write again.

Next month I will tell you how to make a magician's table.

Barry Kent.

MAGICIAN'S STUNTS

At a recent magical convention held in England, a civic reception was followed by various publicity stunts for magic. The outstanding stunts were: Magician Lenz was buried alive for half an hour in a bed of sand; Esme Levante (daughter of Les) did an escape underwater from leg shackles and handcuffs in record time; Oswald Rae did a blindfold walk which astounded onlookers; while Vanzil did an unusual self-decapitation illusion. Great publicity for magic.

THROW YOUR VOICE

into a trunk, under the bed—anywhere.

THE VENTRILO

An instrument fits into the mouth; cannot be detected. With the aid of this Double throat or VENTRILO you can imitate birds, animals, etc. Everything for ONE SHILLING, including a FREE booklet giving you full instructions how to become a Ventriloquist and throw your voice.

Will Andrade 173 PITT ST., SYDNEY. 52 Swanston St., Melbourne.

CINQUEVALLI—THE KING OF JUGGLERS

GYMNAST—ACROBAT—MUSICIAN

It seems strange to me to learn that the name of Cinquevalli is not better known than it is, for it is said that he was one of the world's greatest jugglers—if not the greatest. There is no doubt that he did much for the juggling profession, and originated many dexterous and difficult feats.

HE is known all over the world, and his name is equally famous as that of Houdini. People have come to me on numerous occasions to tell me of the tricks and illusions of great magicians, and it is strange that quite a large number have quoted the magic tricks done by Cinquevalli, forgetting that he was a juggler and not a magician. Actually, they did not know Cinquevalli, but had confused him with some other magician.

There is no deception with Paul Cinquevalli, although his cleverness with some tricks was almost inconceivable. He was one of those jugglers whose tricks or feats could be regarded as really astounding, and whose performances gave genuine pleasure. Tales of him have been told in many lands and in many languages, and no wonder, for he was a most versatile man and a genius. He was a juggler, gymnast, acrobat and musician. It is said that he was also a master of nearly every European language.

Cinquevalli was born at Lissa in Poland, on June 30 in 1859, and when two years of age was sent to school in Berlin, and never returned to his birthplace. Actually he began his career as an acrobat, and might have continued to follow this profession but for an accident. He fell seventy-five feet from a trapeze, and was smashed up, resulting in a stay in hospital for eight months. His acrobatic career thus ended, he turned to juggling, and it was in this field that his name became famous in all parts of the world.

HIS FIRST ENGAGEMENT

It was a very strange set of circumstances that gave him his first professional engagement as a juggler. There was a company of caravan players visiting his town at this time, who were about to do a tour through Europe, and young Cinquevalli in his own words tells the story: "I found the manager standing by one of the caravans in which the company travelled, and informed him that I would like to join his troupe in the capacity of juggler. He sniffed rather contemptuously at my suggestion, and then asked me what I could do. I took off his hat, picked up an empty bottle from the ground and a cork lying near it, and juggled them casually for a couple of minutes.

"I observed that the feat impressed him, though he only shrugged his shoulders and asked me if I could do anything else.

JUGGLING WIZARD

"I then took up five stones, and juggled three with one hand and two with the other, doing separate movements with each set of stones." This settled the matter for Cinquevalli, for he was taken on at once, and commenced on tour the very next day. The company had its "ups" and "downs," and broke up after about four months' tour.

After this he took up with an acrobat and managed to obtain work at a pound a week each. After one week only, the acrobat left the show and Cinquevalli remained, receiving a rise to three pounds a week, which later on was still further raised to five pounds.

TWO YEARS PER TRICK!

Cinquevalli would think nothing of practising for four hours a day on one trick alone, for two years in order to perfect a trick. One trick, he said, took him six years to master. What patience and perseverance.

He has juggled all over the world, before all kinds of audiences under varying conditions, and we can have no doubt that the life of a juggler is no sinecure. Hard work, constant practice and ingenuity in devising new feats, are necessary if one is to succeed as a juggler.

KNOWN, respected and loved by magicians in all parts of the world is our magical identity for this month. Although not a performing magician, he is rightly placed at the head of magic enthusiasts in Australia.

Dr. C. H. Irving is a collector of magic books and literature, and is perhaps better known as "the father of magic in Australia." His private library of magic works is one of the largest in the world. There are thousands of volumes in all languages, English, German, French, Spanish, Hebrew, Chinese and others I cannot identify. Books printed as far back as 1765, giving magic secrets of the ancients, adorn his library shelves. Over a large number of years, he has had a standing order with book publishers throughout the world to reserve for him copies of all magic literature printed by them. Books written by great magicians of past and present times are his. Numerous copies are autographed by the authors themselves, many of whom are his personal friends. In addition to books, leaflets and magazines, Dr. Irving has in his great collection, between four and five hundred photographs of great magicians of the world, a large number of which are autographed with personal messages to him. Money could not buy his collection. His library or den as it might be called is the envy of visiting magicians who frequently gather there to spend a few hours with the Doctor. Books from the floor to the ceiling on three walls meet the eye, whilst the fourth wall is a mass of photographs of almost every great magician.

Dr. Irving has travelled extensively throughout America, England and Europe, and has visited great magicians in all these parts of the world. Many magical celebrities are his personal friends in other countries, and his first-hand stories of magicians' doings are always of great interest to magic enthusiasts who are fortunate enough to be included in an invitation to the den. His collection of books and literature

was commenced when he was about ten years of age, and now it is almost safe to say that any book published dealing with the art of magic or its associated entertainments can be found in this great library.

Dr. Irving, too, was founder and president of many Australian magicians' clubs.

THE WATER THAT VANISHES

A GLASS of water or wine has paper strips pasted over the mouth, leaving no place clear from which to drink the liquid. Yet, when the lights are switched off for a few seconds only—the liquid disappears in a strange and

mysterious manner. The paper strips are still there—but the wine vanished.

IT'S EASY WHEN YOU KNOW HOW

With the aid of a drinking straw you have secretly had in your pocket, the performer drinks the liquid. The strips need not be removed.

* * *

DANTE NOW IN AMERICA

THE great Dante has left England, and is now in America with the whole of his stupendous "Sim Sala Bim" show, together with Danton, his English successor to be. Dante plans a nine months' tour of America and will then retire.

* * *

TWO Scotch magicians were swimming at a well-known bathing pool at Christmas time. They wagered sixpence as to who could stay under water the longer. . . . They were both drowned.

* * *

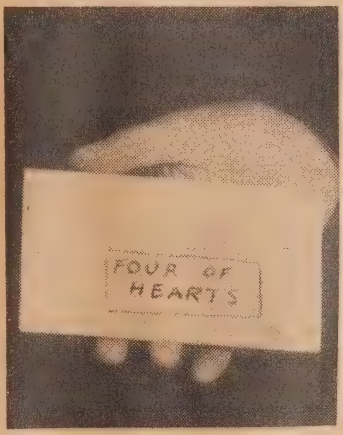
BARBARA TOLLERTON, P.O. Box 1859, Auckland, N.Z., would like magical pen-friends in Australia.

THE BALANCED PACK OF CARDS

This appears to be a difficult trick. You place a pack of playing cards on the back of your hand, so that the cards stand upright. The whole pack remains standing until you remove it.

Secretly add an extra card, which is held between the fingers in the manner shown. The pack leans against this. In removing the pack from the hand, take extra care with the pack.

A LITTLE PRACTICE MAKES YOU PERFECT



MAGIC READING

Any person selects a card and writes its name on a piece of paper which is placed face down in an ordinary envelope and sealed. The performer takes the envelope and simply by holding it to his forehead—the name of the card put is announced.

HOW. Previously cut away a small portion of the front of the envelope sufficient to read an ordinary message or name of card. You can now read the name of the card as you raise the envelope to your forehead. The audience do not suspect the envelope if you have a packet of them together with one prepared as mentioned.

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THE AUSTRALASIAN Radio World

VOL. 4 ..... NO. 10

MARCH 1, ... 1940

The Australasian Radio World announces a policy of expansion and improvement.

Under the direction of a NEW EDITOR, who is one of Australia's most experienced technical journalists, the March issue is packed full of articles which will gladden the heart of any radio enthusiast.

New Circuits, Fully Detailed and Described, Include

- "WONDER"—a one-valve five-band receiver.
- "DANDY"—a 3-valve a.c. superhet of sensationally novel design.
- "THE 1940 WORLD STANDARD"—a powerful dual-wave receiver with unsurpassed fidelity.

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and the comprehensive Speedy Query Service. We're certain that you'll be proud of this one hundred per cent technical radio journal THE AUSTRALASIAN RADIO WORLD.

PACKED WITH INTERESTING ARTICLES WHICH INCLUDE:

● "Circuits the Yanks are using for the 1940-41 season." "How to make and use an output Meter." "A Countryman's Ideal Battery Circuit." Part one of "Simple Testing Equipment," and a remarkable feature article by Don B. Knock.

£100 in PRIZES

The Amplifier Championship of N.S.W. to be held shortly. Read the preliminary details of this contest in the March issue of Australasian Radio World. On Sale March 1st.

THE AUSTRALASIAN Radio World MONTHLY

ON SALE AT ALL BOOKSTALLS AND NEWSAGENTS

:: AMATEURS SERVE THEIR COUNTRY ::

Where are they? What has happened to those well-known VK calls that have spanned space so many times whether it be in the hurry and scurry of contest or the friendly "rag chew" that has started many a long friendship with a fellow "ham" many thousands of miles away. The bands are now silent with the exception of the ubiquitous "W." That beautiful pure crystal musical note, that "band saw" that literally ripped through QRM and the signal that varied from one end of the band to the other, are now silent.

WHEN the news came that war had been declared, all amateurs realised that activities would be seriously curtailed.

Many amateurs were already serving in the various signal sections of our fighting forces. Those belonging to the various reserves immediately reported for duty. From all parts of the State, both town and country, amateurs flocked to the colors. Like our English fellow amateurs, the Mecca of the Australian experimenter was the R.A.A.F.

Although both the Army and Navy have their quota of "hams," it is quite safe to say that the majority have for their motto "Per Ardua ad Astra." This no doubt was brought about by the Wireless Institute of Australia, who had adopted the Royal Australian Air Force Wireless Reserve as its unit.

LIEUT. RAY PRIDDLE

Lieutenant Raymond Priddle, VK2RA, is quite an old-timer as far as amateur radio is concerned. 2RA passed the examination in 1928, but he had to wait several months before he reached the statutory age necessary before a licence can be issued! He is a graduate of the University of Sydney in structural engineering. He was a member of the Council of the Wireless Institute of Australia, New South Wales Division, for a number of years, but military duties compelled him to relinquish this position.

Lieut. Ray Priddle

Sgt. Frank Hine

He won the Crawford Trophy for the best amateur telegraphist in 1937, was runner-up in 1938, and came third in 1939. He also held the position of Flotilla Communications Officer in the Volunteer Coastal Patrol. Most honors in amateur radio have been won by him including: Worked All Continents, 10, 20 and 40 metres, British Empire Radio Transmission Award (B.E.R.T.A.). Worked All States (America), and many others dear to the heart of the "ham."

PETTY-OFFICER DAVE DUFF

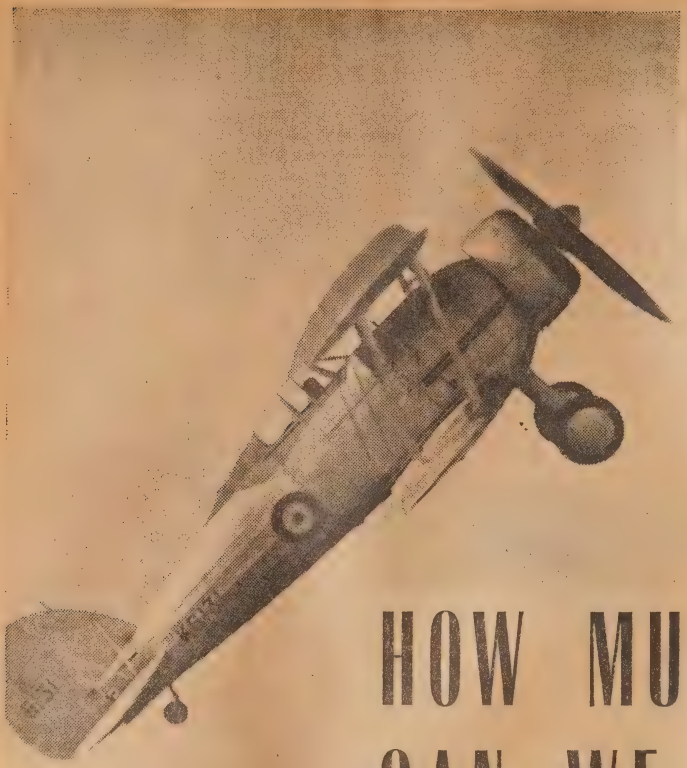
Petty-Officer Telegraphist David Duff, VK2EO, should need no introduction. Among the amateur fraternity he was known as the "ham that never slept." Dave, who belongs to the Navy and has "pounded brass" for his Majesty in many parts of the world, was one of Australia's keenest DX hounds and has won the greatest honor that it is possible for any experimenter to achieve, namely, membership of the DX Century Club. This is no mean feat as it requires confirmation of two-way contact with at least 100 different countries. At the time of writing only six other VK amateurs have attained that honor. B.E.R.T.A., W.A.C., and W.A.S. are also among this sailor boy's accomplishments.

SGT. FRANK HINE

Sergeant Frank Hine, VK2QL, of the R.A.A.F., is another ham who is making his hobby serve his country. Frank is quite a newcomer to the game, but in three short years he has succeeded in gaining his W.A.S., B.E.R.T.A., and W.B.E. He has contacted 107 countries, but needs five more verifications before he is eligible for D.X.C.C. Incidentally, Frank has caused amusement several times when he has written down to the W.I.A. asking them to endeavor to have the R.I. eradicate some local Qrm. He would always tack on to his letter his latest tally of countries worked.

Of course, these are not by any means the only hams serving their country—they are just typical examples of the fine type of operator whom every branch of the fighting forces were anxious to train for the services.

Petty-Officer Dave Duff



GLOSTER GLADIATOR

One of Britain's most famous fighters is the Gloster Gladiator. Despite its high speed, this machine has exceptionally good manoeuvrability, which makes it a nasty customer in a dog-fight. It is powered with a Bristol Mercury engine. Its rate of climb is also worthy of comment, being well above the average. History may yet show that this plane, although not the fastest fighter, may yet be capable of outfighting speedier planes.

HOW MUCH SPEED CAN WE ENDURE?

How fast can men fly? How fast can an aeroplane fly under control? Who cracks first—man or machine? All these points are discussed in this article. "In this war," says the writer, "speed is going to count most in the factories—the speed at which new machines can be made to replace those destroyed in battle."

IT is a far call from the "spads" and "albatrosses" of the last war flying and fighting at round about 100 m.p.h. to the modern high speed Hawker Hurricane and Messerschmitt fighters with speeds approaching 400 m.p.h.

Until recently, speed was apparently considered paramount and every so often a report would come out claiming an extra 10 to 20 m.p.h. for somebody's new fighter.

This demand for speed has, of course, radically changed the design of all fighting aeroplanes, and so, too, have fighting tactics changed.

The design of the interceptor fighter has been based on the theory that, to be effective against heavy bombers, these lighter machines must have at least a 50 per cent. margin in speed.

This was quite practical when bombers flew at 120 to 150 m.p.h. But let's look at the position to-day.

Suppose we consider the German Dornier D.O.-17 as typical of a modern medium bomber. Light, speedy and manoeuvrable, this machine has a reported maximum speed of about 300 m.p.h. Powered by two 950 h.p. Daimler-Benz engines, it carries a bomb load of 2000lb. in addition to very formidable protective armaments.

USEABLE SPEED

To out-manoeuvre and defeat this machine we need, according to our theory, an attack machine capable of 450 m.p.h. It may be possible to get a machine to fly at this speed. The difficulty, however, is to produce a machine which will fight at this speed.

Even allowing for exaggeration in reported performance figures, the problem is a weighty one. The whole point is that speed has been overrated.

Now that the maximum in practical fighting speed has been almost reached, the need arises to develop new tactics which will allow fighters of speeds around 350 or even 300 m.p.h. to combat and defeat equally fast bombing machines.

While very high speed has been losing importance, armament has been gaining. The result is that modern fighters are being equipped with 37 m.m. cannon, firing 1lb. shells through the propeller, any one of these shells being capable of putting a heavily armored bomber out of action.

We might suppose large scale air attacks would be met with the following tactics.

Immediately news is received of the impending attack, interceptor fighters are

despatched to engage the enemy. These machines speed away, using their 370 to 400 m.p.h. to bring them into contact with the enemy machines before these can reach their objective.

The bombers, of course, will have superior armament and be very little behind the fighters in speed. But their heavy load and comparative bulk will count against their manoeuvrability. At any rate, it is safe to assume that the single-seater interceptor will harass them sufficiently to make them postpone their original attack until they have despatched the fighters.

In the meantime, heavier attack machines, two and three-seaters, equipped with cannon and heavy machine-guns, are speeding to aid the interceptors.

ENGLISH FIGHTERS

Two of England's best two-seater fighters come in this latter attack class. They are the Hawker "Hotspur" and Boulton and Paul "Defiant." Beautifully streamlined, low-wing monoplanes, with complete retracting undercarriage.

These machines are heavily armored and equipped to meet the attacking machines on practically equal terms.

Any defending country has the advantage over attacking enemy aircraft in that they are usually able to send into the air a greater numerical force than the enemy, provided, of course, their total aircraft is round about the same as the enemy.

There can be little doubt that attacking bombers will proceed with a protecting escort of fighters and this will lead to mass engagements or dog-fights between the interceptors and the escort. The bombers will be faced with the problem of joining the fight or carrying on without the escort and running the risk of falling victim to a second attack.

In any case, these dog-fights will differ greatly from the combats of the Great War. Planes nearly 200 m.p.h. faster, equipped wtih vastly superior armament, will engage in a furious whirlwind of fighting in which instinct and training will count more than coherent thought.

MODERN DOG-FIGHTS

In "Some Still Live," Frank Tinker, a young American flier, describes his experiences in a large scale dog-fight during the Spanish War.

He says: "Three of our patrols coming up from the south went into action against the second, and what remained of the first, of the enemy echelons. This left only this third echelon to contend with. I took my crew over and closed in.

"After that, accurate observation of the fight as a whole ended. Things were happening too fast even to see what was going on in our own dog-fight . . . There is a mad whirl of planes going round and round. Planes start sliding across my sight; at first only greenish ones with black emblems . . . then planes on both sides slid across so that caution becomes necessary to keep from firing on one's own planes. We have to be careful not to bank too violently or we 'black out.' That is, centrifugal force draws the blood away from our heads and sight dims to complete blackness unless the pressure is eased. To black-out completely in a dog-fight is almost certain to prove fatal."

This was a dog-fight some three years ago. The loyalists were using Boeing P.12 machines, built about 1930. Imagine the still greater confusion that would exist with 370 m.p.h., 1940 models.

By

JOHN CAVILL

Incidentally, an interesting sidelight on this particular dog-fight is that the eighteen Boeing U.12's were matched against 21 Heinkels (1936 models), yet only one of the loyalists went down, whereas eight of the Heinkels were brought down. However, Tinker explains this by saying that the planes were brand new, and infers that they may not have been thoroughly "run in." In addition, "the pilot of each one had been a new Spanish pilot, with no previous combat experience at all."

That illustrates how necessary it is to have capable men as well as super machines. It brings us to the final point in this speed question. How fast can a plane fly and still be controllable?

Tinker points out the danger of black-outs. In faster machines this danger, of course, becomes greater. A rather startling thing happened in America early last year.

Lieutenant Kelsey, crack American test pilot, took a super twin-engined fighter across America at a speed which reached 420 m.p.h.

He finally crashed the machine on a Long Island golf course.

He was segregated from the public and press, and the only information was a rather cryptic statement by one of the doctors that "Lieutenant Kelsey is suffering from extreme nervous shock, **not** as a direct result of the accident."

TOLL OF SPEED

If it wasn't the accident that shattered this man's nerve, then it must have been the strain of controlling this powered thunderbolt.

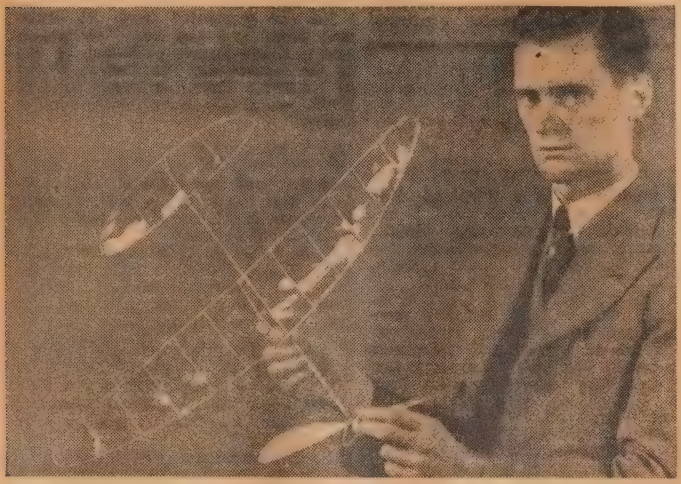
Colonel Justian, of the Medical Corps, made this statement: "The Lockheed XP-38 as a military weapon is without peer among the nations. It is the fastest and most potent fighting machine ever created. But, unfortunately, its operation at full throttle over extended periods will be a physical impracticability, for no flying officer will be able to withstand the amazing acceleration, high speed, and mental problems the ship presents."

To dive momentarily at 400 m.p.h. is within the bounds of human possibility. Some American test pilots claim 700 m.p.h. in terminal velocity dives. But to manoeuvre and fight at these speeds just can't be done.

In this war speed is going to count most in the factories. The speed with which new machines can be made to replace those destroyed in battle.

A German Messerschmitt fighter in flight.

HOW THE INDOOR CHAMPIONSHIP WAS WON



Jack Finneran and his winning model, which lifted the record to 8 mins. 42 secs.

Jack Finneran of Parramatta is the N.S.W. Indoor Champion of 1940. He earned this title at West's Theatre, Darlinghurst, on Sunday, 11th February, narrowly beating Jim Fullarton, of Bondi. The actual times were 8 min. 42 secs. and 8 mins. 37 secs., Finneran winning with the small margin of 5 secs.

IT was the best indoor contest we have seen for many years. About twice as many models as were seen at the last contest were flown at the championship. The first and second times both broke the previous record for small halls.

One fuselage model was flown. It was very well built by Eric Askenbeck, of Bondi. It flew well, but was a little large for the size of the hall.

A splendid picture of the winning plane. This picture, in conjunction with the scale drawing on the opposite page should enable anyone to duplicate the model.

Smaller models around 24in. wingspread were favored. They can be made to circle tightly and so dodge most of the hazards.

Once again climbing caused trouble—the ceiling is less than 60 feet from the floor. The slowest models took, roughly, 2½min. to reach this height. Others hit the roof in a little over one minute.

NATURAL FLYING

The "natural hazards" in the theatre consist of five large ornamental lights hanging from the ceiling. Luckily, these lights are covered with large cylindrical frames, which, although they project some twelve feet from the ceiling, have no projections which might catch the models. On striking one of these lights the model simply bounces off.

There is, however, a large ornamental ventilator which has plane sides, but leaves a gap of a foot between itself and the ceiling; on several occasions models were caught in this opening.

Jack Finneran was first to fly. He sent his model up in a slow, even circle, and after three minutes circling the roof, it started to drift towards one of the walls. It collided with the wall and ended its flight at 3min. 30sec.

Jim Fullarton improved on this time, but he, too, collided with the wall.

STERN FIGHT

The contest settled down to a fight between Fullarton and Irwin Frost, of Goulburn. Frost finally took the lead with 6min. 52sec.

Tom Peters, of Bondi, was flying well, but couldn't pass the six-minute mark.

Jack Finneran's bad luck was continuing on his second flight. His model caught in the ceiling after 2½ minutes, and on the third he collided in mid-air with another model which was being test-flown. This latter flight, however, was counted a delay since the time had not passed 30sec.

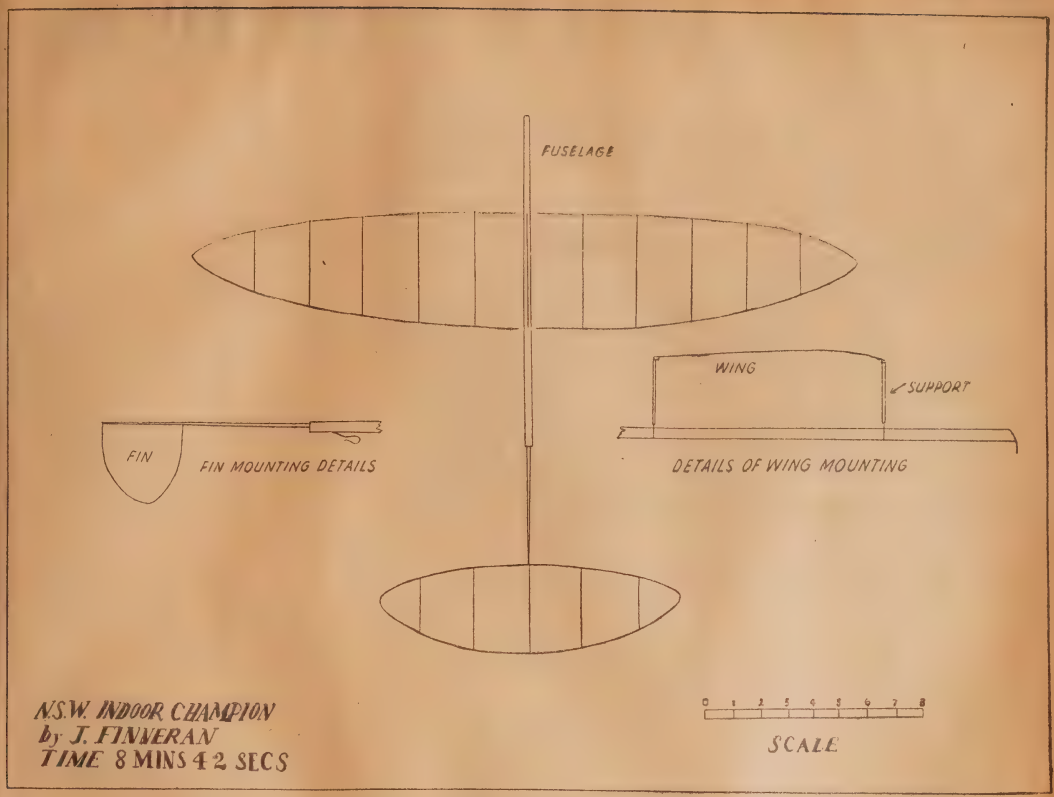
Frost also was running into bother, and had a climb to the roof in search of his model, which disappeared into the ventilator.

In the meantime, Fullarton got his model away for a beautiful flight of 8min. 37sec. The flight was perfect. It climbed slowly, eventually colliding with the lights, recovering each time, and continuing down, after a record time for West's Theatre.

WINNING FLIGHT

Finneran had one flight to go. His last flight was almost a copy of Fullarton's. He managed to keep away from the roof and landed with a five-second lead.

Frost still had one flight to go; his



A scale drawing of the winning plane. The wing fin, and stabilizer are covered with micro-film.

last chance to take home the trophy for 1940. His model climbed fairly fast with a very tight circle. It, too, struck the lights with very little adverse effect, but Frost was very unlucky when the model landed in the gallery, some 25 feet above the floor. His time was in the vicinity of five minutes.

This left Finneran the winner. His model was well designed and well built. Covered with microfilm, it weighed about .08oz.

The wing was a swept forward ellipse, 24 inches in span, and with a 4½in. centre chord. The wing section was "McBride," B.7.

PARASOL WING

This wing was set parasol 2½ above the stick. It was set slightly off centre to counteract torque, and give about 3in. polyhedral for stability. A feature of the wing was the bracing of human hair.

The motor stick was the traditional hollow tear drop, 12in. long, with a further hollow boom mounting the tail. The boom was 7½in. long.

Finneran was alone in his use of a flat tail set at about 2 degrees positive. Roughly, 33 per cent. tail area was used.

The model was powered with a 19in. loop of 1-32 sq. M.R.L. rubber, driving an 11in. propeller.

This design was typical of the models flown. Fullarton and Frost flew models that closely resembled this design. Except that they both used lifting, cambered stabilisers.

Frost used more area. His models had 24in. by 5in. elliptical wings. He had three models, all identical. This made the parts of each interchangeable, and offered good insurance against crack-ups.

His tail surfaces were quite large. About 40 per cent. stabiliser area was used. It perrsitted Frost to carry out an unusual manoeuvre.

Because of the low ceiling, it was essential that the model took as long as possible to reach the ceiling. Frost's model climbed fairly quickly. But he had adjusted it so that it stalled about once every half-minute. This stall would drop the model some eight feet; the large tail area would allow it to recover, and it would climb again. This delayed the climb a great deal, and undoubtedly added time.

INGENIOUS TRIMMING

When the power decreased so that the model could no longer climb, the stall disappeared. This was a very unusual way of combating the high ceiling problem.

Another unusual feature of the contest were three baby jobs flown by Derek Bayliss, John French, and Arthur Goard, all of Chatswood. These models each had less than 50 sq. in., and yet were able to turn in duration well over the three-minute mark.

In the past the indoor championship has been an unusual event, and the only contest for indoor models flown during the year. However, the demand for more contests has grown, and so successful was the last contest that a movement has been started to introduce an inter-club series for indoor models based on the lines of the present outdoor inter-club contests.

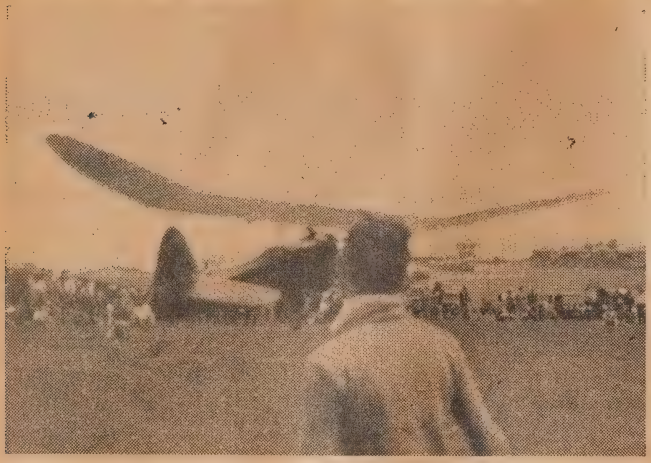
CONTESTS FOR MARCH

Contests have been arranged for March 17 and March 31.

At Dumbleton on March 17 the Illawarra Cup contest will be flown. This contest is for Wakefield models, hand-launched, and is intended as a preliminary for the Wakefield elimination trials held this year in May.

On March 31 the tenth round of the inter-club shield will be flown at Parramatta. The Leichhardt team are now certain of victory in this series. Up to now they have been almost undefeated and have established a lead which must carry them on to victory.

WHY USE PARASOL WING DESIGN?



Here is a petrol-driven model in a perfect take-off. It illustrates the stabilising effect of the parasol wing.

Every model plane builder has his own idea of wing design. This has always been a contentious matter since planes first began to fly. The modern trend is all towards the use of the parasol type wing. This article tells you just what is involved in the use of this type of wing.

THE trend in model design has led to the almost universal use of high or parasol wings.

This has been brought about by a process of trial and error. But there are several aerodynamic reasons which have led to this preference.

The advantages of a parasol wing are mainly three:—

(1) The increase in effective longitudinal dihedral.
(2) The reduction in resistance.
(3) The increase in stability due to favorable centre of pressure movement.

First let us translate into English number one of these reasons.

Longitudinal dihedral is the difference in angular setting between the wing and the tail. This assists in producing fore and aft stability in much the same way that lateral wing dihedral produces lateral stability.

ACTION OF WING LIFT

When a wing lifts it displaces a quantity of air downward. This air striking the stabiliser increases the effectiveness of the angular setting. A parasol wing promotes this action.

So much for our first argument. The second question of resistance makes itself fairly obvious. A wing set above the fuselage on a clean, streamlined mount will naturally reduce parasitic resistance. In addition, the effective lift of the wing is increased.

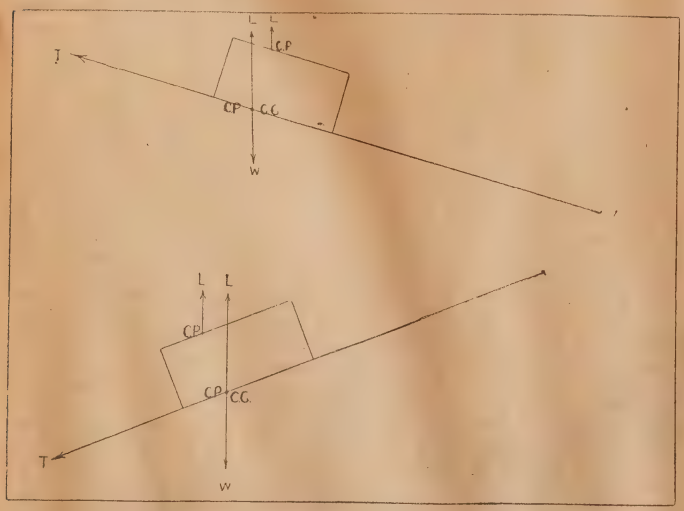
Thirdly, we come to the most important action of a parasol wing, the action which does so much to prevent stalling, and which makes a parasol wing essential on a lifting tail model.

Referring to the diagrams we see a graphic illustration of the action of centre of pressure when a model climbs or dives.

On both these drawings two positions of the wing are shown and a comparison made between the action of a parasol wing and a mid-wing. For the sake of clarity, the structure of the model has been eliminated and only the position of forces marked.

The thrust is shown acting along the line of flight. The lift is shown acting vertically upward, and the weight of the machine acting vertically downward through the centre of gravity.

In level flight the lift would be directly above the centre of gravity. We might explain here that to illustrate this action we are neglecting the C.P. movement inherent in the aerofoil.



A diagramatic representation of the wing in practice.

CHECK WITH DIAGRAM

The first diagram shows the model beginning to climb. In the case of the mid-wing, where the C. of P. is on the same horizontal line as the C. of gravity (here we show the two coinciding), there has been no change, hence no corrective action tending to bring the model back on a level keel.

The parasol wing, however, has caused the centre of pressure to move backward. It is obvious that the two forces of lift and weight will produce a righting action.

The effect of this action will, of course, be balanced by the thrust, so that a

parasol wing will not stop your model climbing, but rather prevent excess climb which would lead to a stall. The model will climb at any angle provided sufficient power is used.

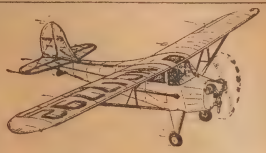
The second diagram illustrates the action in a dive. Here again the parasol wing tends to bring the model to level flight, and here, too, the thrust will be assisting in pulling the model out of its dive.

The higher the wing the greater is this action. But—and there is a "but"—the position of the wing raises the line of the line of resistance, and the greater the difference between the positions of the lines of thrust and resistance, the greater is the difference between power flight and glide. For this reason the excessively high parasol wing produces a steep glide.

If, however, a high line of thrust is used in conjunction with a parasol wing, the steep glide can be overcome, and a model can be produced which will fly consistently, both under power and on the glide.

American sailor: "That ship of ours goes so fast that we often have to stop to cool the propeller."

English tar: "That's nothing. Our destroyers go so fast that we have to stop to pick up wireless messages."



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54 INCH MODEL

Its Special Features Are—

- Shock absorbing landing gear.
- Moveable controls.
- Cabin door and interiors.
- Detachable wing.
- Automatic wing jig.
- Finished propeller.
- Motor roar device.

The Kit contains everything necessary for building the above.

PRICE **12/6** POST **1/-** N.S.W.

JUST IMPORTED FROM AMERICA

"KOMET" and "GUILLOW" Solid Model Kits

1/9 each

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LISMORE PLANS BIG CONTEST

The Northern District Division of the M.A.A. has planned a championship series to be held at Lismore over Easter. There will be two contests, one for petrol-powered models and one for rubber-powered models. Both will be flown on Sunday, March 24, and prizes will be awarded at a prize-giving dinner to be arranged for Sunday night.

THE prize-list is as follows:—

Petrol-powered Contest. — First Prize: Chiming clock, in polished wood case, value £6 10s. Second Prize: Gold Wrist Watch (fully guaranteed), value, £3 17s 6d. Third Prize: Travelling Rug, value £2 10s. Fourth Prize: 4½in. Pneumatic Wheels, value 19s 3d.

Rubber-powered Contest (hand-launched, weight rule).—First Prize: Gold Wrist Watch (fully guaranteed), value £4 7s 6d. Second Prize: Red Zephyr Kit, value £3 8s. Third Prize: Pen and Pencil Set, value £1 10s. Fourth Prize: 1lb. 1-12in. Square White, value 13s 6d.

Let's see what we have to do to get some of these prizes. Both contests are open championships, and entry is, therefore, open to all-comers.

Proxy-flying is permitted, with one qualification. Proxy fliers must belong to the same association as the builder.

The petrol models have no size or weight limit. They may use any motor. The fuel allowance is 2 cc. per lb. of the model's weight. Any flight of less than 10secs. will be classed as a delayed flight. Three such flights will displace one official flight and three official flights will be allowed. The best duration established during these flights will be counted.

The take-off must be entirely unassisted. One hand to one wing tip will be allowed, but the model must not be lifted off the ground nor must it be pushed in any way.

So much for the petrol contest. The rubber-powered models must weigh 1½oz. per sq. ft. of wing area. They will be checked before flying for weight and fuselage measurements. There is no limit on size.

The contest will be for hand-launched models, but they must have undercarriages to support the model on the ground, and be strong enough to allow the model to take off. No part of the under-carriage may be dropped in flight. Retractable or folding under-carriages will not be allowed. This rule is quite definite, so if your model has a folding under-carriage you will have to fix it so that it does not fold.

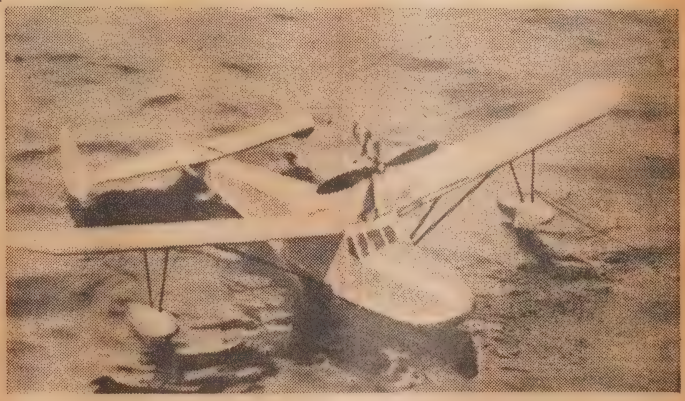
Three flights will be allowed, and there will be no delayed flights given. Best duration will count.

Usual flying conditions will apply. Fliers will be called on in rotation, and must be ready to fly immediately they are called upon.

No test flights will be allowed during the contest except when permission is granted by the contest director. Flying will commence sharp on 9.30, and the programme will be as follows:—

Petrol-powered contest from 9.30 a.m. to 12.30 p.m.; lunch, 12.30 p.m. to 2 p.m.; rubber contest, 2 p.m. to 5 p.m. At 7 p.m. the prize-giving dinner will commence.

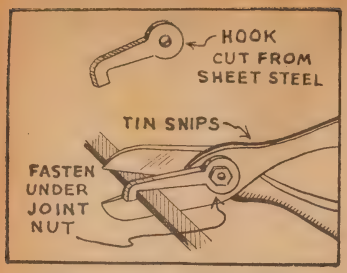
JIM FULLARTON'S MODEL FLYING BOAT



A beautiful model now undergoing tests. It will be remembered that Jim described a model R.O.W. plane a few months ago in Radio and Hobbies.

HINTS FOR YOUR WORKSHOP

By Walter G. Nichols



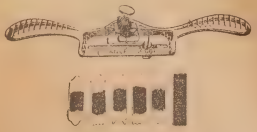
MAKE YOUR TIN SNIPS MORE EFFICIENT

WHEN cutting thick strips of metal or wire there is usually a tendency for the metal to bend or the wire to roll away from the cutters. Cut the hook from a piece of sheet metal, as shown in sketch, and fasten under the joint nut of the snips. When not in use the hook can be turned back along the handle of the snips and so be out of the way.

* * *

OFTEN one has occasion to cut short a spindle of a radio set after the control itself has been wired in place. This often imposes a considerable strain on the component due to the action of the saw. An obvious and simple method of avoiding this is to clamp the end of the spindle in a vice. The vice can be used as a guide for the saw blade.

STANLEY UNIVERSAL HAND BEADER



For beading, reeding or fluting. It is also adapted for light routing. Fitted with two Gauges, one for straight, the other for curved work. Supplied with 8 Cutters.

Price 13/9

Stanley Plow Plane, No. 54.

Price 35/3

Stanley Chisel and Cutter Grinder

Price 12/6

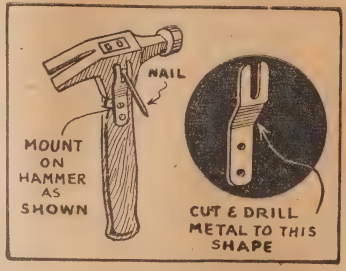
Stanley Jointer Gauge.

Price 17/9

NOCK & KIRBY LTD.
Phone M 7403
GEORGE ST., SYDNEY

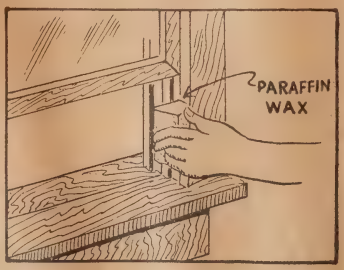
HANDY HAMMER ACCESSORY

A VERY simple gadget can be easily made which will hold a nail and give it a start in the wood so that you will find it very easy to hammer home. This is made from a piece of scrap metal cutting, and drilling as shown in sketch. When mounted on hammer, insert the nail and strike one firm blow which will embed the nail firmly in the work. Disengage the nail from clip and drive home.



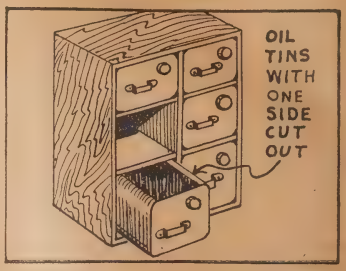
FOR THAT RATTLY SHACK WINDOW

ONE often strikes window trouble in the shack in hot weather—the window will rattle in wet weather; the self-same window will stick and refuse to open. The trouble is that the wood is swelling and contracting due to the amount of moisture absorbed by the wood. To fix the trouble, rub the grooves of the window with paraffin wax as indicated by sketch.



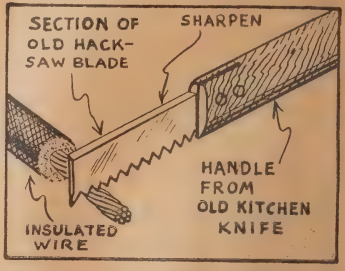
* * *

WHEN your soldering iron has had some heavy use, the tip is apt to become dirty. The difficulty is to clean it without the need for retinning. A piece of cloth or a small brush are both excellent for this purpose. They will remove the dirt and burnt flux while the iron is hot.



USEFUL CABINET

A VERY useful cabinet for the workshop can be constructed from a number of two-gallon oil tins and some scrap lumber. Sizes are not given, as the size of cabinet and number of drawers will be left to the constructor. Remove one side from each of the tins and construct the cabinet to accommodate the number of tins required. The handles on the tins make excellent drawer-pulls. The construction is plainly shown in the illustration.



HANDY INSULATION SCRAPER

A SECTION of hacksaw blade mounted in an old knife handle and ground to a sharp edge on the side which has no teeth will make a useful little tool. The insulation is removed with the sharpened edge and the wire scraped with the toothed edge.

We Manufacture

GENEMOTORS

Low to High Tension up to 35 Watts output.

SOLENOIDS for Industrial Use.
TRANSFORMERS & CHOKES.

G. COLTON

59 ERSKINE STREET, SYDNEY.
B3510.

LISTEN IN FOR THESE

(Continued from Page 61)

AFRICA

CR7BE.—9640kc., 31.12m., Lourenco Marques, Mozambique. Still being heard in the mornings, from 5.0 till 7.0. (Hallett.)

VQ7LO.—6083kc., 49.32m., Nairobi, Kenya. Good signal from this one between 4.0 a.m. and 5.0 a.m. (Medina.)

Radio Tananarive.—9695kc., 30.95m., Tananarive, Madagascar. Good strength when opening at 1.0 a.m., but a lot of interference. (Medina.)

Radio Tananarive.—6063kc. 49.48m., same location. This one is much better than the one on 30.95m. at the same time.

I2AA.—9650kc., 31.09m., Addis Ababa, I.E.A. Opens at 1.0 a.m., but interfered with by VLW2; much better at 6.0 a.m.

ZRO.—9755kc., 30.75m., Durban, South Africa. Quite good strength around 2.0 a.m.

ZTE.—11,800kc., 25.42m., same location. Now on its correct frequency, but not very strong at same time as ZRO.

ZRL.—9606kc., 31.23m., Cape Town, South Africa. Now only a weak signal in the early morning, at 2.0.

ZRH.—6007kc., 49.94m., Pretoria. Still being heard in the early morning around 6.0, but not very strong.

TPZ2.—8960kc., 33.48m., Algiers, Algeria. This one is again being heard in the mornings at 7.0, at fair strength.

AUSTRALIA & OCEANIA

VLR.—9580kc., 31.32m., Lyndhurst. Very loud every night, especially from midnight till 12.30 a.m. (Foster, Lee, Cox, Medina.)

VLR3.—11,850kc., 23.32m., same location. In the daytime this one can be heard at good level. (Lee, Foster, Cox, Medina, Gaden.)

VLW2.—9560kc., 31.38m., Perth. Heard at fair level from 2.0 a.m. till 4.0 a.m. in South African session.

VLW2.—9650kc., 31.08m., same location. This is the frequency used for the night transmission, which is very loud. (Foster, Cox, Medina, Battis.)

VLW3.—11,830kc., 25.36m., same location. At 10.0 a.m. can be copied at most locations. (Foster, J. H. Emery, Cox, Medina, Battis, Gaden.)

VLQ.—9615kc., 31.21m., Sydney. One of the most powerful stations on the air around 9.0 p.m., and now overcomes TIPG at 10.0 p.m. (Lee, Cox,, Gaden, Battis, Daley, Medina.)

VLQ.—9680kc., 30.99m. New frequency taken into use, but not used when TPC28 not in use.

VLQ2.—11,870kc., 25.27m., same location. Another very powerful outlet of this Dept. of Information station, heard best 5.30 p.m. (Foster, Gaden, Battis, Medina, Cox, J. F. Emery.)

VLQ5.—9590kc., 31.28m. Not used regularly, but when on the air is interfered with by VUD2. (Foster.)

VPD2.—9535kc., 31.47m., Suva, Fiji. Not very strong at our location, but best just before closing at 8.0 p.m. (Hallett, Cox.)

MISCELLANEOUS

CSW4.—15,215kc., 19.71m., Lisbon, Portugal. When it opens at 2.0 a.m. is quite fair strength.

CSW5.—11,040kc., 27.17m. Same location. Heard at good strength in the early morning. (Foster, Medina, Lee.)

CSW7.—9740kc., 30.8. Same location. One of the best stations on the 31-metre band around 7.0 a.m. (Foster, Lee, Medina, Battis.)

PCJ.—9590kc., 31.28m., Huizen, Holland. Only heard occasionally this last month on Monday morning before 6.0 a.m.

PCJ2.—15,220kc., 19.71m. Same location. A really loud station, with very interesting programmes from 10.40 p.m. (Medina.)

PH12.—17,770kc., 16.89m. Same location. Very badly interfered with by the French station TPB3, and hard to copy. (Medina.)

SVJ.—9825kc., 30.53m., Sparta, Greece. This is the new station mentioned in article this month.

YUC.—9505kc., 31.56m., Belgrade, Yugoslavia. Good strength in early morning, but hard to separate from GSB after 6.50 a.m. (Foster, Lee, Medina, Gaden.)

TAP.—9465kc., 31.7m., Ankara, Turkey. Still being heard at excellent level in early morning till 7.30 a.m. (Foster, Lee, Cox, Medina.)

TAQ.—15,195kc., 19.74m. Same location. Again on the air at night, gives news in English at 10.15 p.m. (Battis.)

SBP. — 11,705kc., 25.63m., Motala, Sweden. Only heard on Sunday night from 6.0 p.m. (Cox.)

SBT.—15,155kc., 19.8m. Same location. This one is heard at same time at much better strength. (Cox, Battis.)

HVJ.—6190kc., 48.47m., Vatican City. A very loud station on some mornings at 5.15 a.m. (Foster.)

HVJ.—15,120kc., 19.84m. Same location. Used on Tuesday nights with special broadcast at 11.30 p.m. Also heard on Thursday morning from 7.30 a.m. till 8.0 a.m. (Medina.)

HBO.—11,402kc., 26.32m., Geneva, Switzerland. Heard on Sunday afternoon at 5.0 p.m.

LYR.—9290kc., 32.29m., Kaunas, Lithuania. Has been heard on two Sundays opening at 10.30 p.m. All talks.

LKQ.—11,735kc., 25.57m., Oslo, Norway. This Norwegian can now be heard on most nights at 10.0 p.m., but is rather weak. (Cox.)

THE SERVICE MAN WHO TELLS

(Continued from Page 29)

As the trouble with these volume controls is usually purely a mechanical one, the most satisfactory method of overcoming it is to replace them with new ones, but if a new unit of the correct value is unobtainable a temporary repair can often be made. In the case of wire-wound potentiometers inserting a thin piece of very fine glass-paper or sandpaper between the rotating arm and the resistance element will often clean away a deposit of dirt or corrosion, and after any dust or dirt is removed by a piece of cloth the control may be quite silent.

CARBON POTENTIOMETERS

The carbon type potentiometers are a little more difficult to deal with, but with these it is frequently possible to make a temporary repair by removing the dustproof cover at the back and rubbing a piece of ordinary lead-pencil on the carbon strip.

The graphite in an ordinary lead-pencil is an electrical conductor, but it has quite a considerable resistance. If the carbon film is damaged on the potentiometer, it is sometimes possible to repair this by simply using an ordinary soft lead-pencil and rubbing it several times over the patch where the crackling noise is experienced so as to form another carbon film. This, of course, is only a temporary measure, and as soon as possible the unit should be replaced with a new one.

USING AN OHMMETER

If an ohmmeter is used for checking the resistance of a potentiometer any noisy spots will usually be indicated by either a sudden jump or no reading at all on the ohmmeter scale as the shaft of the potentiometer is turned. A good potentiometer should give a gradual increase or decrease of resistance as the shaft is rotated.

Every good serviceman should keep not only a mental record, but a briefly written one, too, of the various receivers he handles, the apparent symptoms, and the methods used in curing the trouble. I have occasionally seen trouble shooting charts which are designed to help the serviceman locate troubles quickly. These are also very excellent and can be thoroughly recommended.

A.V.C.

(Continued from Page 25)

mally operated on fixed negative bias. When a valve such as the 1M5-G or other type operating at zero bias is used in the second I.F. stage, it is preferable to operate it with some small negative bias in order to avoid grid current, but alternatively a 1 megohm resistor may be used from its grid to earth so that any positive grid current would produce additional negative bias. At the same time the screen should be supplied through a dropping resistor from B plus.

ANSWERS TO CORRESPONDENTS

UNDER THE PERSONAL SUPERVISION OF THE EDITOR

W.H. (Adelaide, S.A.) likes our magazine well, but wants to know why we don't use better paper.

A.: Yes, we appreciate how much nicer it would be to have better paper, but there are insuperable difficulties in this matter. The paper we use is the best quality newsprint which it is possible to run on the rotary newspaper machines which are used. A rotogravure plant is available, but the cost would be quite prohibitive unless our circulation were over a hundred thousand copies. Naturally we hope that the future will reveal ways and means of getting a better production, but for the time being we have to make the best of things.

K.K. (Adelaide, S.A.) is building "Tiny Tim," but wants to use a 42 instead of a 6F6, and wants to know the socket connections, also which condenser to increase to deepen the tone.

A.: The 42 has a six-pin base and looking at the socket from the underside there will be noticed two pins which are larger than the rest. These are the filament pins, and working around in a clock-wise direction the other pins are as follows: Plate, Screen, Grid and Cathode. To deepen the tone you will need to fit an extra condenser, one of about .001 mfds. from the grid of the 42 to earth, or one of about .01 mfds. across the loud-speaker.

G.W.A. (Prospect Gardens, S.A.) wants to know why we do not describe an electric clock mechanism to work from batteries.

A.: A description of a battery-operated electric clock mechanism appeared in the "Wireless Weekly" for April 29 last, but still there is something to the thought, and we will go into the matter in the immediate future.

V.K. (Geelong) asks for details of a four-valve transmitter for c.w. operation, using a 71A, a 22 and two 50 type valves.

A.: The valves which you have are entirely unsuitable for a transmitter, and as all amateur transmitting licences have been cancelled, it is not our policy to publish any transmitting circuits. To be caught operating a transmitter at present would be a very serious matter. The 50 type valve was never much use in transmitter circuits, except for low-powered modulators for phone operation. Its characteristics are quite unsuitable for use as an r.f. oscillator or r.f. amplifier.

S.P.M. (Swan Vale) has a seven-valve commercial receiver which lacks selectivity.

A.: From your remarks it appears the receiver is out of alignment, and that you are using a very large aerial. From what we can remember, this particular model is not a superheterodyne (and the makers cannot help us out in this respect), and so it should be merely a matter of peaking the gang trimmers about the middle of the band and bending the condenser plates to correct inaccuracies which show up at the ends of the bands. Try a short aerial of 25 feet, or even less. If realignment does not help and the set is inherently unable to separate stations properly there is no simple solution to your problem.

I.T. (Grafton).—You can vary the tone by varying both B battery voltage, and also the A battery voltage with a rheostat, as long as you do not exceed 2 volts for the latter. Also various values of condensers wired across the primary of the transformer will alter the tone of the oscillator. It is rather hard to get a high-pitched whistle from such a job—the tone is nearly always fairly deep in pitch.

C.G.G. (Dulwich).—We doubt whether you would get enough gain from the inverter to drive the output valves to their limit. It would be more suitable for a pentode output valve circuit. About 750 ohms would do for the speaker field. The type number of the speaker would not be altered by virtue of the field resistance. It will be the same for all values.

M.J.G. (Nanango).—Yes, you can use the 1G6G in place of the 19 in the Duplex Single, and results will be approximately the same as those with the 19. Also the valve uses much less current. We are glad to know that you are so pleased with the receiver. As you say, it certainly is a wonderful little performer.

E.M.B. (Sydney).—The only damage you can do to your equipment by playing through the frequency record would be to so overload the speaker as to strain the suspension of the cone. This would be possible if you attempted to put the full wattage of the amplifier through at, say, 50 cycles, but we do not know the maximum rating of your speaker at that frequency. This, of course, would be very important. As far as the amplifier and pick-up are concerned, we do not think you could do any damage. The pick-up should be robust enough to stand such treatment, and the amplifier should merely overload and distort if the volume is turned up too far. The only way we can suggest to measure the response is to use a high-grade audio oscillator, with a check on the input voltage, and feed the output into a suitable non-inductive load connected to suitable voltage-measuring devices. This is hardly simple, but we can't think of any other method.

YOUR QUERY ANSWERED FOR A SHILLING!

In response to many requests, we have decided to re-introduce the Shilling Postal Query Service. This means that if you want your queries answered by mail, send 1/- Postal Note or Stamps, and you will receive your reply within a few days.

The fact that Radio and Hobbies is published monthly means that without such a service, urgent queries could not be answered, possibly for several weeks, through the columns of the paper.

Make your questions as clear as possible, and if you can, group them together at the end of your letter. This makes it much easier for us to answer them.

If you send a Postal Note, make it payable to "Radio and Hobbies." Our address is 60-70 Elizabeth-st., Sydney.

USE THE MAIL FOR QUICK REPLY SERVICE

T.E.R. (Petersham).—The set you mention has interested several of our readers. We may be able to go into it at some future date, and maybe present an adapted version which will suit our readers' requirements. At the moment we have no further details about it. The Master Six would not have as good tone as a T.R.F. set because of its high selectivity, but it's not as bad as all that, you know! At a glance, there appears to be no reason why the pick-up should not work in that position. Are you sure it is not at fault? Your symptoms sound very much as though the rubber damping blocks have collapsed, and the pick-up armature is fouling the field magnets.

R.A.W. (Oakleigh).—It is almost impossible to answer your questions. The voltage would depend entirely on the type of arc you have in mind, and we have no details available here which would enable us to estimate your wants. We suggest you make some inquiries among firms which deal in this apparatus. Also it is quite impossible to estimate whether you can use an adaptor with your broadcast set, as each of these things must be worked out to suit the set with which it is being used. If it is a superhet, as we assume it is, your best plan would be to use a converter, and not an adaptor.

A.E.B. (Strathfield).—We do not particularly advise this set for gramophone work. It was not designed with this in view. For using a meter when lining up, it must be an A.C. type, and is connected to read volts, and wired across the loud speaker. The volume control is then adjusted so that the reading on maximum volumes is within the range of the meter. Use a fairly high scale for a start, in case the lower readings should be insufficient, and the meter damaged through overload.

D.L.W. (Clarence Town).—Sorry, but we can't answer queries by mail. We don't think you would find a crystal set very satisfactory where you are, and would suggest at least a one-valve set. What about the job described in this issue? This should be the most suitable type for you, and it can be used for loud-speaker operation if required. You would do much better with it than with a crystal set.

B.T. (Edmonton).—It is not usually satisfactory to rebuild sets of this type for A.C. operation, as the change-over is likely to be costly, and would probably mean a complete redesign of the whole chassis. We suggest that you write direct to the manufacturers and ask their opinion on this matter. After all, they know more about their own receivers, and would be the best people to advise you.

Dr. Zarkov (Lockhart).—Sorry, but we have no circuit on hand that would use the parts you mention. However, a satisfactory amplifier could probably be built up around the 6D6, 41, and 80. We suggest you use the 6D6 as the driver, the 41 as the output valve, and the 80 as rectifier.

D.D. (Coogee).—Thanks for your letter. Afraid we haven't a circuit exactly similar to the Sky Hound Six. However, in the Christmas issue of "Radio and Hobbies" we described a Super Advance six-valve set which will give excellent results. Quite possibly this set will suit your purpose.

F.S. (Wentworth Falls).—Sorry, but we have not sufficient space in this column to publish a list of radio symbols and their meanings. We suggest that you write to one of the larger booksellers who can possibly supply a book containing this information. However, at a later date we may publish an article on this subject.

H.J.B. (Umina).—One of the advertisers in "Radio and Hobbies" might be able to supply this chassis ready built. We suggest that you write and obtain a quote for the set.

G.B. (Parkdale).—The coil seems to be at fault. Why not return it to the manufacturers for rechecking. Glad you like the paper and we may be able to use your suggestion for an article later. By the way, make sure your aerial is not too long. A long aerial will restrict the tuning range in this set.

K.V. (Parramatta).—We hope to be able to include some crystal set circuits in an early issue of "Radio and Hobbies." Perhaps one of these sets will interest you. A 12-inch speaker could only be used providing the output of the set was sufficient to operate it. If the receiver is of the normal type, using five valves or more, you should have no trouble providing the field and input characteristics of the two speakers are the same.

D.F. (Ashbury).—Sorry, but we haven't any plans similar to Tiny Tim operated from batteries. However, the three-valve portable set in the Christmas issue of "Radio and Hobbies" should suit your purpose. If you send us sixpence in stamps we will post you this issue. What about the simple two-valve set in this issue?

F.W.S. (Thirlmere).—You should get satisfactory results with another stage added to the two-valve set. However, the Duplex Single described in the Christmas issue of "Radio and Hobbies" is a one-valve set that will work a loud speaker quite satisfactorily. If you send us sixpence in stamps we will post you this issue.

W.A.G. (Meridale).—Under the present conditions it would be entirely useless to present any articles on small transmitters. The Duplex Single circuit in the Christmas issue of "Radio and Hobbies" should interest you. It is cheap to build and can produce quite good results.

A.E.S. (Adaminaby).—Suggest that you check the capacity of the tuning condenser. It should be from approximately .00035 to .0005 to match the special coil. If you use too long an aerial the loading effect will restrict the tuning range. Try a shorter wire.

F.P. (Macksville).—Thanks for your letter and good wishes. We may be able to print an article as you suggest in a future issue of "Radio and Hobbies."

W.T.L. (Sandford).—It is quite correct to obtain a reading between grid and earth. This reading will not be as high as the actual bias, but will indicate that a bias voltage is being applied to the grid. The speaker could not be used with a battery set, as you have no power to excite the field coil.

M.C.H. (Cottesloe).—The circuit is incorrect as there is no bias for the 32 valve. The selectivity would be very poor by connecting the aerial direct to the grid. We suggest that you use a R.F. stage. Using the usual coils with primary and secondary windings would probably improve the reaction. The 19 would not have enough drive to work the output 19. Why not use a pentode output valve? The 60-volt battery would not be sufficient to work the set to full capacity. Would not advise the frame aerial.

K.M. (Muscle Creek).—The Wireless Institute of Australia are now conducting Morse Code classes. We suggest that you write to the secretary W.I.A., New South Wales Division, Box 1734JJ, G.P.O., Sydney, for full particulars. We might mention, however, that it is impossible to obtain an amateur's licence while the war is on. The price of the Wireless Telegraphy Handbook of Regulations is 1s 6d. We do not know the other book you mention.

J.C.Y. (Hobart).—A 3-valve Portable Set using 1.4 valves was described in the Christmas issue of "Radio and Hobbies." As the prices of parts are subject to fluctuation we suggest you write to any one of the advertisers in "Radio and Hobbies" for a quote. If you send us 6d in stamps we will post you this issue.

T.J.F. (Auckland).—Many thanks for your letter and the circuit it contained. We will have a look at your circuit, and in a future issue may be able to print it for those readers who are interested in building amplifiers.

N. McK. (Maroubra).—As a regeneration control is usually 50,000 ohms or more, a carbon type potentiometer is used, as wire wound types are not usually made in this value. However, much depends on the current now. If there is a large current flow a wire wound potentiometer should always be used, as a carbon type will not carry much current. The condenser should be quite O.K. to use on the Duplex Single. Glad you like the paper.

G.H. (Elsternwick).—Sorry, but we can only answer letters through the postal service. If a 1s Postal Note is enclosed. From the information in your letter it is very hard to determine the trouble. However, since there is poor volume in this set, you might have the audio transformer connections reversed. This would give a step down effect instead of a step up. An outdoor aerial is better for this set, and a good earth should be used. If the coils are wound as described, you should have no trouble with them. The original set gave excellent results, and there is no reason why your set should not give similar results.

G.A.L. (Lower Ferntree Gully).—Thanks for your letter and encouraging remarks about the paper. The connections for Little Jim's Mate on the coil are:—Black, B plus; Pink, Plate; Yellow, grid; and Blue, earth.

W.E.M. (Port Lincoln): Many thanks for your interesting letter. Although we have done nothing about the binder just yet, we are giving the matter our serious consideration. Some of our model parts advertisers may be able to supply you with the plans you require. We suggest you write direct to one of these.

Tapper (Tarumbarra): Sorry we fooled you with the "Spare Time Camera." It was just a "modern fable touched up scientifically." Thanks for good wishes.

P.W.F. (Gayndah): By subscribing direct you will be assured of receiving your copy of RADIO AND HOBBIES promptly. Thanks for your suggestions. We must have anticipated them, because in this issue we have printed an article on producer gas. Glad you like the paper so much.

L.H.B. (Stanthorpe): The 1D8GT would not be very much improvement over the 19 type for Little Jim's Mate. It is difficult to say whether it would pick up stations 200 miles away, although under ideal conditions this might be possible. We may be able to print a circuit as you suggest in a later issue.

A.H.W. (Narrogin): There was no January issue of RADIO AND HOBBIES. The Chrisum's issue was published in place of this issue. The Raytheon type BA 350 mA Gaseous rectifier valve uses a 4 prong medium base. The connections are as follows when the bottom of the socket is viewed and the pins followed around in a clockwise direction: No. 1 pin, Plate; No. 2 Cathode; No. 3, No connection; No. 4 pin, Plate.

G.C. (North Fitzroy): We appreciate your very interesting letter. The circuit appears very interesting to us, and we shall certainly give some thought to it. Thanks also for the pick-up curve. Our experience has been that the original type of cartridge is still hard to beat.

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MORE ABOUT USING THE ELECTRIC FENCE

In our last month's issue, we printed an article concerning an "Electric Fence," to be made with an old Ford spark coil as the basis for the unit. Since then, we have been conducting a little research on our own account, and have had some rather interesting experiences.

HAVING a friend who owns a farm not very far from Sydney, we thought he would be a good man to test out the idea in practice.

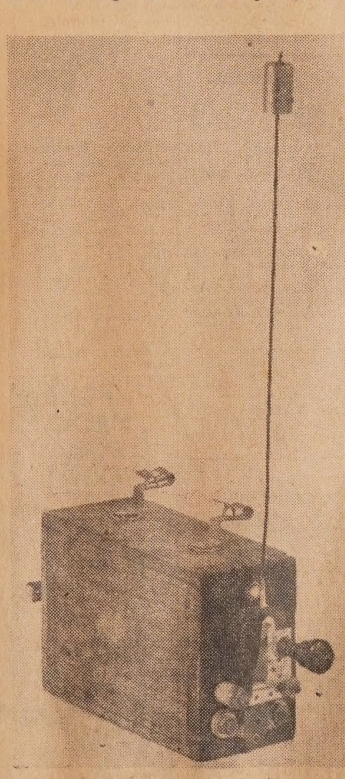
So we dug up a coil, and made the necessary modifications substantially as per the article. At the moment, our friend is busy erecting a number of temporary fences so that he can try out the effect on his various farmyard animals.

We had no trouble at all in getting the coil to behave itself. The remodelling of the "trembler" assembly was only a matter of half-an-hour's work.

Instead of tapping the adjusting screw through the brass plate, we soldered a large nut to the plate, first drilling a hole so that the screw itself could clear it.

This made rather a more substantial job than the tapping process.

Where the bends occurred in the plate we ran hard solder on the inside of each, as it is almost impossible to bend this metal without cracking.



Here is the unit with which we have carried out our tests.

A REAL SPARK

With six volts on the unit, a spark of almost terrifying dimensions was obtained. Between the two electrodes, there was a jump of pretty well three-quarters of an inch! Enough to give one a real "bump" if he took it all.

Connected to a length of fencing, one of the difficulties is to prevent the spark from jumping the insulators. As a result, large hefty components should be used. Otherwise, it is likely the spark will jump between the fence wire and the wire holding the insulator to the stake.

An amusing sidelight was provided by some unfortunate ants which decided to walk over the insulators to see what it was all about. We shall never know their thoughts, because they are now in the next world! Some were cooked, and others were simply flattened!

It would appear that, providing the insulation is good, the unit will give good results as it is. A possible improvement would be to re-wind the coil to give a lower voltage, but a higher current. We are investigating this matter, and if we can arrive at some reliable data, we will let you have it. The main thing is to find out what are the voltage and current limits consistent with safety. Incidentally, good results are possible with only four volts. An accumulator is the best source of power.

It would seem that a barbed wire would be more suitable than a plain wire with this unit. Feathers on a duck seem to afford good insulation against a plain wire, but a barb should fix this. Pigs and rabbits, however, generally approach such a wire nose first. Under these circumstances, they are hardly likely to come back for more.

Our friend is wildly enthusiastic about the possibilities of the unit, so in our next issue we may have some further first-hand experiences to pass on. In the meantime, we would be interested to hear from any of our readers who have tried out the unit for themselves.

Special High Toned, easy adjusted, highest possible grade, Super Morse Code Buzzer, 15/-. Made by Levenson's.

Special Prices to Wholesalers and Retailers.

Morse Code Keys, as illustrated. Adjustable all ways. 12/6.

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48/6

Just arrived from the maker in London. Cosmocord de Luxe Crystal Pick-up, with incorporated Volume Control, 48/6. Usual Price, 75/-. Write for Full Lists.

Play, Talk, Sing, Joke through your Radio. Great Fun. Batteryless Type Microphone for Hand-holding or Hanging, 22/6. Complete with Lead, fixed in a second. Others 12/6, 15/-, 17/6, 25/-, 28/6, 32/6. All plus 1/9 for Battery and 1/6 for 20ft. Cord.

39/6 39/6

B.G.E. Table Type Microphone. Highly recommended for Amateur or Professional use. Built-in Transformer and Battery, with Volume Control incorporated. Just plug into pick-up terminals of any set. 39/6.

Build Little Jim's Mate from Wireless and Hobbies. Charts and All Directions, 6d. All Parts, 31/5; Valve, 13/6; Batteries, 11/-; Phones, 10/6. Built, complete, £3/16/5.

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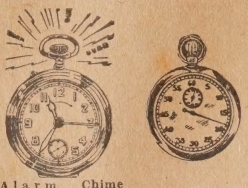

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25/-

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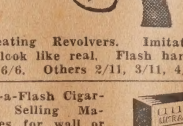

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Fixed Crystal Detectors, with mounting clips, 2/6, 3/6, 4/6, and 5/6. Semi-fixt Types: Liontron, Lion-Micro, Imperial, 5/6. Red Diamond, 3/6. All Semi-fixt Midget, 2/6. Red Diamond, 4/6. Refills, 1/6.

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Wanted: Agents to Sell Our Lines.

J.R. (Punchbowl).—The issue which described Little Jim's Mate is now out of print. In a future issue of "Radio and Hobbies" we may be able to reprint this circuit.

J.H. (City).—It is quite normal for the 6P6 in Tiny Tim to get too hot to touch when the set is in operation. All modern output valves and rectifiers give off considerable heat.

P.B. (Brighton) wants the size of the speaker and gauge wire used to wind coils for the Duplex Single.

A.—A five-inch Perm. Magnet speaker should give satisfactory results. The broadcast coil should be wound with 32 gauge wire and the short-wave coil with 26 gauge wire. Either silk-covered or enamel wire can be used.

G.A.S. (North Sydney).—There is enough output from the amplifier to work two guitars and a microphone without adding any extra stage. A crystal type microphone would probably be the most suitable type to use with this apparatus. Thanks for your good wishes.

J.A. (Melbourne).—Many thanks for your letter and circuit. It would be almost impossible to cover from 8.5 to 50 metres with one coil. In good operation it would be essential to have some method of measuring grid current if you had a shot at working out the coils. So many factors come into the picture, according to your particular layout, that it would be very difficult to estimate turns for you. The coils would be so small that even half-turns might make all the difference.

W.A.M. (Heidelberg) wants to know how to make Little Jim into a short-wave receiver.

A.—If you construct the tuning circuit similar to the Duplex Single and use Duplex Single plug-in coils, you should get satisfactory short-wave reception from the major overseas stations. If you require the issue describing the Duplex Single, we will post it to you immediately on receipt of sixpence in stamps. An aerial about 30 feet in length and erected fairly high should give good results.

H.S.T. (Moonee Ponds).—Sorry, but the information you require would take up too much space to answer in these columns. However, we hope to be able to print an article on electric door-bell chimes in an early issue of "Radio and Hobbies," as such an article should interest many readers.

M.L. (Malandra).—We hope to publish some simple crystal circuits in an early issue of "Radio and Hobbies," and probably one of these will suit you.

L.P.M. (Kalpowa).—From the information in your letter, it seems that the coils are at fault. We suggest you have them checked by the man who sold them to you or by the manufacturer.

L.R.T. (Coraki).—Thanks for your nice letter and the circuit. We have had the idea of a tinder for "Radio and Hobbies" under consideration for some time, but unless there is likely to be a large demand for it, would probably prove too costly to produce. Since you have not given us enough information about the type of vibrator, we cannot advise in this matter. However, we can say that a vibrator unit will not work with A.C.

AC/46.—It would be difficult to say why the circuit will not work, as we have never built the set. Candidly, we usually shy clear from these freak sets, as, at the best of times, they are hard to handle. Probably one of the major faults is in the Choke 12, with its centre tap not being properly adjusted to the circuit. Suggest that you experiment with this tapping and see what you can do.

W.V. (Brisbane).—The home-made microphone was descrited in the September issue of "Radio and Hobbies." Copies of this issue are still obtainable from our office for 6d in stamps.

C.G.McC. (Dunedin).—Your experiences with the T.R.F. sets are very interesting and we are pleased to hear of them. Thanks for your kind remarks about the paper and the circuit you enclosed.

A.McL. (Brisbane).—We already have an amplifier similar to the one you refer to, in our laboratory for testing. We quite agree that the performance is first class and hope to be able to publish some details of it in a future issue of "Radio and Hobbies."

F.G.R. (Baulkham Hills) wants plans to build a refrigerator.

A.—Sorry, but an article such as this is beyond the scope of "Radio and Hobbies." We do not know of anybody who could supply you with this information, but would like to mention that to build a satisfactory refrigerator you would need to be a skilled tradesman in this class of work, because of the technical details involved.

"Simple Beginner" (Ashfield).—Sorry, but we are unable to answer your query. As there are so many different makes of R.F. coils on the market now, and since you have not stated the make of coil that you have, it would be quite impossible to give you the connections.

TECHNICAL BOOK REVIEWS

ALTHOUGH our book reviews for this month are not actually technical books in the true sense of the word, we are quite sure that they will have a definite appeal to the average person who likes to know what makes the "wheels" go round.

ELECTRICITY TO-DAY, by T. B. Vinycomb, M.A., Oxford University Press, London. Price, 6/9.

This volume is a valuable edition to the already numerous books published on this subject. It explains in simple, concise language the uses and functions of electricity under present-day conditions, so that even the layman can get a clear conception of the subject. Not being a text-book, all mathematics have been omitted, which is quite a boon to the not-so-technically inclined reader.

To anyone desiring a good general knowledge of electricity and allied subjects, we recommend this book.

MOTOR CARS TO-DAY, by John Harrison, A.M.I.A.E. Oxford University Press, London. Price 6/-.

For the mechanically-minded man this volume should prove quite popular. It traces the growth of motor cars from their very early days up to the present time. Each main car component has been described fully, and in such a manner that even the novice can easily follow the author's reasoning.

The book is profusely illustrated with photographs and easy-to-follow diagrams.

Copies from Angus and Robertson, Castlereagh-street.

M.G. (Cremorne).—Sorry, but we are unable to advise further on your set, as there is not enough information in your letter. However, as the fault you mention could be caused by so many different things, it would be advisable if you were to see your local service man. Although the portable set described in June issue of "Radio and Hobbies" is a comparatively simple set to build, it might be advisable if you commenced by building a simpler set first. Why not try Little Jim in the April issue?

K.F. (Warwick).—As prices of materials are constantly changing, we suggest that you write direct to one of our advertisers for quote on parts for Pentagrid Portable. We appreciate your kind remarks on our paper.

K.McG. (Mundubba).—Why not use one of the transformers described in the directions that you have? Alternatively, you could order a transformer to give the required current and voltage from any of our advertisers, who could have it made up for you. With regard to the book on static, your best plan would be to write to some of the larger booksellers, who issue catalogues of their technical books, and see what they have to offer.

A.R.J. (Dimboola).—Up to the present we have not described a three-valve T.R.F. set in "Radio and Hobbies," but if the demand is great enough for one, quite possibly we could feature one at a later date. Glad you all like the magazine.

E.M. (Glen Oak).—The first circuit would only be practicable if a separate filament supply was provided for the 1K4. We do not advise this method, and suggest you obtain a type 15 indirectly heated valve, and use it as a triode. The bias could be obtained in the usual way by means of a resistor in the cathode circuit. The second circuit would not work because there would be no drive for the second 1D4. Glad you like the paper, and we may be able to use your suggestions at a later date.

S.A. (Coburg).—The equivalent types of the 19 are the 53 and the 6A6. The former is a 2-volt valve and the latter a 6.3-volt type.

H.D. (Tabulam P.O.).—Owing to the unsettled international conditions it is almost impossible to state which is the most powerful station operating on the broadcast band. However, station WLW at one period was operating with a power of 500 k.w., but we are not quite sure whether this station still broadcasts with that power.

P.G.B. (Vaucluse).—From your diagram we don't know what valves or voltages you are using, so we can't assist you very much. However, the valves you mention would not be suitable for adding another stage. They are very old types, and would not have enough gain. Why not use a pentode output valve to suit the voltages you are now using?

L.R. (Adamstown).—Thanks for your letter. The August 2 issue of "Wireless Weekly" contained the special Short Wave supplement. If you send us 4d in stamps we will post you this copy. As the prices of parts are liable to change, we suggest you write to any one of the advertisers in "Radio and Hobbies" for price. They will be pleased to quote on this set.

R.S.O. (Glenelg).—The Midget condensers for the Amateur 3-Valve Set should be 25 mmfds. each. The resistor should be 1400 ohms and not 14,000.

P.F.J. (Adamstown).—Sorry, but we have not a copy of the circuit you mention. The issue which contained such a circuit has now been long out of print.

L.S. (Dora Creek).—The issues containing Little Jim and Little Jim's Mate are now out of print. However, at a later date we may be able to reprint these circuits for those who missed them. The Duplex Single in the Christmas issue is a small set that should interest you. It is easy to build and can give quite good results. The subscription rates of "Radio and Hobbies" are 6s for 12 months and 3s for 6 months. If you care to send us a remittance for either of the above amounts, we will post you a copy each month.

N.V.W. (Macksville).—The Vibrator type of amplifier described in the February issue of "Radio and Hobbies" should interest you. It is operated from a 6-volt battery, and can give good results. Glad you like the paper.

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Wholesale Distributors of Radio and Electrical Goods and Accessories, including Kit parts for all R. & H. Circuits. Distributors of Musical Instruments, including "Maxitone" Electric Amplifying Guitar.

Short-Wave Correspondents

Ray Simpson's mail-bag will be dealt with each month through these columns. If you have anything you want to know about Short Waves, look for your answer here!

A.J.P. (Melbourne).—Many thanks for your good wishes and suggestion. We may be able to include this type of set in an early issue of "Radio and Hobbies." Glad to hear that the Portable Set turned out so well. It's certainly a great little set.

F.A.S. (Kurri Kurri).—A 5Z3 with low emission would have a low output voltage and also a tendency to cause hum. If the diodes in the valves you mention showed low emission the set would be affected. However, since the diode and triode section of the valve use the same cathode, it is quite unlikely that the diodes would have low emission if the other section was O.K. A fault in the set such as a faulty connection, &c., or even a faulty valve could cause the station to waver from its correct position on the dial.

S.J.G. (Jandowae).—The portable set should work satisfactorily on the truck if you use a vertical "fish pole" aerial similar to those used on cars.

"Licence" (Newcastle).—Providing you have a current licence for the family radio it is not necessary to buy another for the set you have built. Thanks for your good wishes.

N.C. (Kegarah).—The eliminator will be suitable providing it is in good condition. The top line of holes provides the high tension voltage. The first hole is B— and the others connect to tappings from about 22 volts to 150 volts. Since you have not marked the voltages on the diagram we would suggest you use the second or third position. It is essential that not more than 90 volts are applied to the valves. The second row of holes are C plus, C— 1 and C— 2 in that order. The next two rows of holes are used to obtain the grid bias. The C plus lead is earthed and the C— lead connected to the grid return. Then by moving the plug in the bias holes, the correct voltage can be tapped off. The second C— lead is used if a second valve needs bias. If so, the bottom row of bias holes are used. The gauge wire used in winding the Duplex Single coils is 26 gauge for the short-wave coil and 32 gauge for the broadcast coil. Either cotton-covered or enamel wire can be used.

W.R.F. (Babinda).—We have never actually tried the Pentagrid Three as a dual-wave receiver. Although we think it might be a bit small for dual wave, there's no harm in trying. Since it performs so well on the broadcast band it should at least bring in the major overseas stations, providing a good aerial and earth are used.

"Lektron" (Bellevue Hill).—Thanks for your letter. Your experiments with your sets are very interesting. However, we think that the 4/39 described in August issue "Radio and Hobbies," would be a much better set. This is a 4-valve superhet using a 6K8G, 6F7, EBL1, and 80. It is an excellent performer on the short-wave band as well as the broadcast band. In an early issue of "Radio and Hobbies" we may be able to have an article on amplifiers. Afraid the one-valve pocket set would not be practicable.

R.P. (West Wyalong).—There was no January issue of "Radio and Hobbies." Actually the Christmas issue took the place of this issue. Glad you find the paper so interesting.

T.P. (Newmarket).—You are quite right. The connections you mention are incorrect. However, if you follow the wiring diagram you should have no difficulties. The filter choke is a 80 m.a. type and should be connected as you state in your letter. Thanks for your kind wishes.

S.C.F. (Stroud).—It is quite possible to add a R.F. stage to the Advance 1939. The Super Advance Six is practically the same circuit as the Advance 1939, but with a R.F. stage added. You would have to use a 3-gang condenser if you add the R.F. stage. There is no reason for noise on the stations if the set has been built as instructed. Suggest that you check your aerial and earth. The 6F6G is quite suitable for this set, as the 6C6 would have too much gain.

L.S. (Lithgow).—The parts you have used are quite suitable. If you shield the leads to the volume control, most of the noise will probably disappear. Also a .0001 condenser connected from the plate of the 1H5G to earth would probably help. Glad you like "Radio and Hobbies."

J.G.H. (South Lismore).—A circuit using 30 and 31-type valves would not be exactly modern. Only a straightforward type of set could be designed around these valves. At the moment we haven't such a circuit on hand, but if you care to send us a postal note for 1s we will draw you a suitable circuit.

J.A.W. (Pyrmont).—Of the sets you mention the Junior Radiogram would give you the best results. It was only designed for broadcast band, but could be used on the short-wave with a converter. With the converter its performance would be equal to the best dual wave sets.

A.D. (Longreach).—Both the valves are probably 201A type. They have a standard 4-pin base, and the connections are the same as in type 30. They would be quite suitable to use in a morse code oscillator. Glad you like "Radio and Hobbies" so much.

L.F. (Peat's Ferry).—Many thanks for your interesting letter. You seem to have studied the amplifier problem quite seriously, but we do not think that your explanation is quite complete. We have no plans for a battery short-wave set similar to the 2JU Special Six just yet. There is not a large demand for this type of set. We might mention that there is a series of six-volt valves which have a current drain of .15 amp. Possibly, these may interest you. If you write to the valve manufacturers they will supply you with the valve data sheets.

R.R.S. (Canberra).—Thanks for your suggestion. In a later issue of "Radio and Hobbies" we may be able to describe a seven or eight-valve set. We would welcome any ideas from those interested in such a set. Nothing has been done about the binder yet. Glad your portable set was quite satisfactory.

E.H.H. (Coff's Harbor).—Thanks for your suggestion. In a later issue of "Radio and Hobbies" we may be able to have an article on model boat building.

D.O. (North Sydney).—Afraid we don't know of any firm handling kits under the terms you mention. However, why not write direct to any of our advertisers? They will be able to give you this information. Glad you like "Radio and Hobbies."

N.N.R. (Lindfield).—The circuit you mention is quite suitable. The 6V6G valves would give you little if any extra advantage. The output would be decreased by connecting the 6F6G or 42 valves as triodes.

H.R.K. (Melbourne).—Sorry we omitted the gauge wire to use. The broadcast coil is wound with 32 gauge and the short-wave coil with 26 gauge. Enamel or cotton covered wire can be used. In the original coils the enamel wire was used for the broadcast coil and the cotton-covered wire for the short-wave coil. We appreciate your kind remarks about the paper.

H.L.M. (Tweed River).—In a later issue we may be able to publish a large battery receiver for all you country chaps. Glad you like the paper. It certainly is worth waiting for.

P.S.G. (Geelong).—The output section of the 1D8GT must be biased 4.5 volts. Otherwise the set should be O.K.

Mr. Roy Hallett (Enfiled, N.S.W.).—Have written you by mail re the broadcast band DX section, which you mentioned in your letter. Will discuss this matter with the editor at the earliest I can manage. Many thanks for notes re stations.

Mr. J. H. Emery (West Leederville, W.A.).—Many thanks for your reports on receiving conditions in the West, and they are acknowledged in this issue. Hope to hear from you again.

Mr. H. K. Cox (Cobden, N.Z.).—Many thanks for your letter giving your report on reception in your district. Yes, I think the station you previously reported on 11,990kc. would be the Polish one. Hope you are receiving the "Radio and Hobbies" all right. February issue sent day of issue.

Mr. H. Medina (Waverton, N.S.W.).—Once again you have sent one of the best and most comprehensive lists of the month, and hope you also will be one of the entrants in the competition which we have announced in this issue. You will have received our letter by now answering your other queries.

Mr. H. I. Johns (Nelson, N.Z.).—Very pleased to get a letter from such a well-known N.Z. listener, and hope it will be the first of many more. Have written you by mail, which you will have received before you read this.

Mr. Harold E. Parsons (West Pingelly, W.A.)—Have just received your letter of last November, and very pleased indeed to get it, and have answered you by mail.

Mr. J. Ballantine (Mosman, N.S.W.).—Have only just received your letter, and have answered you by mail, but hope to hear from you again in the future.

Dr. K. B. Gaden (Thargomindah, Qld.).—Am sorry that an acknowledgment of your last month's letter was missed out from the February issue, evidently through lack of space. Yes, we have also found the 49-metre band rather hard now owing to prevailing static. Hope you enjoy the U.H.F. notes in this issue, as they are the very latest available.

Mr. R. K. Clack (Chester Hill, N.S.W.).—Many thanks for your note re K4USC, which we have covered in this issue. That Columbian on 9570kc. has us beaten now, due to the terrific interference, but we should get news of it from the U.S.A. in time for next issue.

Mr. A. Lee (Dubbo, N.S.W.).—We certainly appreciate the conditions under which you have to receive the short-wave stations, and often wonder how you do so well all things considered. We hope by the time you read this you will have had a pleasant holiday away from the grasshoppers and other worries.

Mr. B. W. Battis (Coraki, N.S.W.).—Many thanks for your report with all its news. We have two receivers, a 13-tube Radiotron Senior, and also an 8-tube Silver Super, both home constructed. We are considering writing another article on verifications for an early issue. Thanks for the clipping which was very interesting.

Mr. C. Daley (Berhampore, N.Z.).—Many thanks for your letter, which we have answered by mail, and we trust this has cleared up the mystery of these stations for you. Glad you like the magazine so much, and hope you can get it in future.

Mr. M. Foster (Mount Vincent, N.S.W.).—Glad to hear the cards from the stations are coming along all right, as it certainly adds an interest. Hope you will be entering the competition as your loggings should put you well in the front. Hard luck about the coffee, but I guess you could supply some from behind the counter.

Mr. R. Henderson (Burnley, Vic.).—Many thanks for your letter, and have handed the technical part of it to the department concerned. Glad you enjoyed the display in Melbourne, and wish I could have been there. Yes, I remember visiting you when I was down that way in 1938.

Mr. R. Richard (Moore Park, N.S.W.).—Am afraid I cannot identify the stations you mention as I have no record of any such calls in my call-books. Suggest you obtain an old copy of the Amateurs Call-book Magazine from Swains, in Pitt-street, price about 6d. This will give you the address of the majority of the stations you mention, though we doubt if it is worth while writing to the W6 stations, though you may be lucky.

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